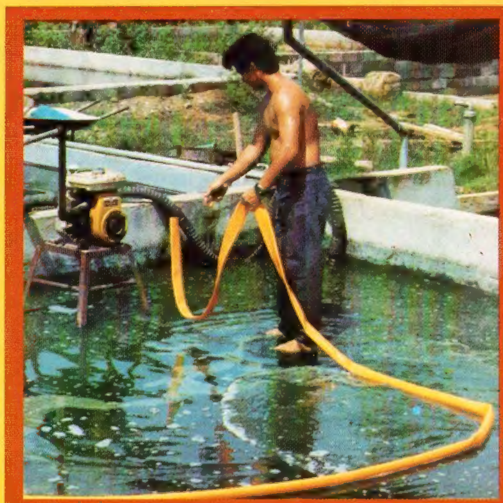
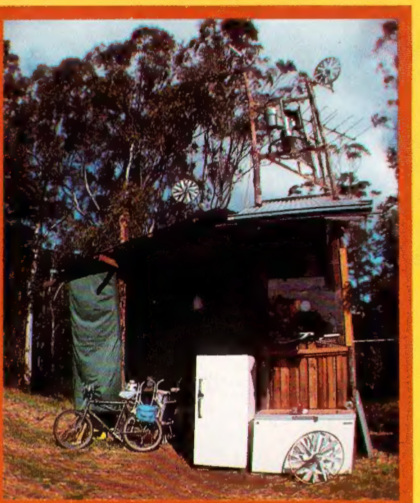
Autumn
No 49 — February, 1986/$2.75*

EARTH GARDEN





Chlorella culture
(Growing algae for stockfeed)
Homemade ladders
Building blues
Ferrocement roofs
Babaco
Poll Herefords
Haymaking
Peter Pedals' TARDIS
The Solar Pack
Running on 6 volts
Energy Pulse
Solar Transport
Energy Works! Extra
HARD TIMES HINTS
Genteel frugality
Kashmir Houseboats
Evening Primrose
Access, land lines
& unclassifieds
Soper with Chaucer
(A Medieval feast for
four people)

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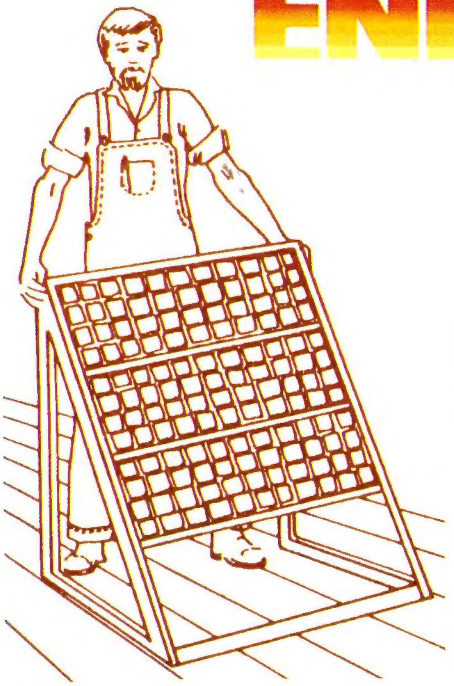
ENERGY WORKS!



HOME ENERGY SYSTEMS

By Keith Smith

Nelson, Melbourne, 1985, large format paperback, 211 pages, illustrated with scores of photos and diagrams.

Introductory offer — $19.95 posted

Why spend the rest of your life paying someone else for your electricity?

The question seems superfluous in Energy Works! (Nelson Publishers), by Keith Smith.

Using the book as a guide — anyone able to read and handy with a screwdriver could power their home and workshop with electricity from sun, wind or water.

Unlike many starry-eyed do-it-yourself, alternative lifestyle handbooks full of the joys of the simple life, Energy Works! is a practical, handyman's manual.

It includes suggestions on where second-hand materials may be obtained, the most reliable types of commercially produced components and instructions so clear that much of the trial and error . . . will be eliminated . . .

Energy Works! realises the need of most people to make their life as comfortable as possible by the use of electricity . . .

The first section of this book is a crash course in electricity, followed by chapters on power from the sun, wind and water, batteries and storage techniques, how to convert appliances to home power supplies and the tools needed to do it.

The book carries a range of clear diagrams and the instructions are written with a commendable lack of technical jargon so that even the uninitiated can follow them.

Keith Smith has called on a number of successful innovators to describe their own adaptations and inventions in the electrical field and some of these make good entertainment, even if the reader has no intention of putting them into practice . . .

The book also has a most helpful list of suppliers of parts from highly sophisticated solar cells to the simplest connector, a glossary of the few technical terms used in the text and in notations, and the book is indexed by reference at the back as well as by chapters after the preface.

Barbara McLennan, *Launceston Examiner*, December, 1985.

The Illustrated
EARTH GARDEN HERBAL

Compiled by Keith Smith

Nelson, large format paperback, 157 pages, 120 woodcuts. Special price $5.50 posted.

This quality book, printed on fine white paper, is an ideal gift for anyone who loves herbs and gardens, or the classic 16th century herbals about them. Covers fact, fantasy & folklore of 40 herbs, with growing tips for Australia and medicinal uses. The herbalists, Dioscorides, Pliny, Strabo, Gerard, Parkinson and Culpeper speak of these beautiful, aromatic plants with delight. Make herb candles, vinegars, oils and salves, conserves and candies.

The Settler's Guide

Old time skills and bush lore

Compiled by Keith Smith

Nelson, Melbourne, 1983 (second printing), large format paperback, 176 pages, illustrated, index. Price $15.95 posted.

Pioneer a bush block from 'go' to 'whoa'. How to clear, fence, square a gatepost, whitewash, build a slab hut, a rammed earth house or timber windpump, harness horses and select and care for tools like axes, adzes, planes, mauls, crosscut saws and scythes. Tried and true advice from *The Agricultural Gazette* of NSW, 1890-1910.

HARD TIMES HANDBOOK

Survive — and thrive!

Keith & Irene Smith

Nelson, 1984, paperback, 204 pages, with 70 illustrations by Elaine Norling, index. Price $7.50 posted.

HARD TIMES HANDBOOK outlines a new, self-reliant approach to city living. How to do more with less, be prepared for blackouts and food shortages, save energy, make money without a job and manage your food supply. Make bread, yoghurt, soft cheese, candles and soap. There are 150 recipes for cheap, healthy tucker and 180 household hints.

HARD TIMES HANDBOOK is now being reprinted. This is the last stock of the first edition (and probably the last copies at this price).

Earth Garden, started in 1972, is the original Australian journal of self-reliance. It is intended as a friendly forum of practical ideas, shared knowledge, sources and alternatives.
It's about putting a roof over your head, growing your own food, using alternative energy and surviving — and thriving — in the city or the bush and the inner changes which follow when you are in tune with nature.

Published and edited by Keith and Irene Smith.

Illustrations by Elaine Norling.

We welcome advertisements appropriate to the aims and ideals of Earth Garden, but reserve the right to refuse ads at our discretion. Send SAE for display rates.

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EARTH GARDEN 49

The cover

Front: Top left: Washing ponds after harvesting algae in the Philippines. *Top right:* Peter van der Wyk's TARDIS at Blue Knob, near Nimbin, NSW. *Centre:* The pilgrims at 'Soper', from *The Canterbury Tales*, 1526 edition. *Below:* Libby and David pack granite stones into the wooden formwork while building Jacqueline French's house.
Back: Recipes for Aquapatys, Salat (salad) and Fenkel (fennel) in soppes from the manuscript roll *The Forme of Cury*, presented to King Richard II by his household cooks in 1390. Reproduced by permission of the British Library, London.

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PLEASE READ THIS CAREFULLY

Land lines are for people, buying, selling, seeking or sharing houses and land. We charge a flat rate of $12.00 (prepaid) for a listing of 50 words (maximum), plus full name and address (compulsory) and phone number (optional). Readers have the responsibility to check all deals. This is not a lonely hearts column. Copy deadlines, EG50: April 10, EG51: July 10.

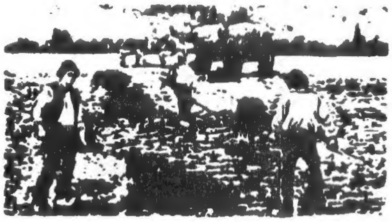
We are selling two parcels of land to finance our meditation and retreat centres. One parcel is 278 acres with majestic views, river frontage, in valley with three New Age communities involved in yoga, growth in awareness, natural agriculture and building. Price $100,000. Also adjoining 155 acres with four building permits and same qualities. Price $50,000. Suit community.

Please contact the Secretary, Ontos Community, Buchan, Victoria, 3885. Phone: (051) 55 0215.

Gippsland, Victoria. Small six-year-old vineyard (539 vines) and beautiful three-bedoom mudbrick home, 43 acres partially cleared, with two titles. Frontage onto splendid permanent Freestone Creek (good swimming holes). Workshop and winery built over cellar, 18 fruit trees, native garden. Power 5 Kva diesel generator/inverter. Private, 13 km from Briagolong, 30 km from Maffra.

Pat Waters, Dargo Road, Briagolong, Victoria, 3860. Phone: (051) 45 5337 or (051) 45 5313.

land lines



Ravenshoe, North Queensland — 53.204 hectares of rainforest for sale. Undulating, no clearings, buildings, power or improvements. Adjacent to Mt Major National Park with a permanent creek as boundary. Private access road off Tully Falls Road. Portion 166, Parish of Ravenshoe. Price $55,000 — $60,000.

Phone (07) 202 7291 AH Write to Max McEwan, 128 Weekes Road, Moggill, Brisbane, Qld. 4070.

Seeking a single woman, with or without children, as co-buyer of 100 acre share at the Two Waters. Must love nature, independence, down-to-earth free living and be able to cope with work when needed (building your own house for instance).

Enquire, Maurice Moure, The Two Waters Farm, PO Box 63, Tabulam, NSW 2470.

Shares at Robb Farm Hamlet, Nimbin 10 minutes. Creek frontages, open and timbered sites, average lot size 5 acres, Council approved. Water to each lot, 240 V close by, all lots surveyed. Prices $14,500 to $17,500, internal roads included in cost. Tight, practical legal package.

Contact Mick Cahill, C/- PO Uki, NSW 2484, or phone (066) 797 184.

Northern NSW, 324 acres picturesque valley. Clean creek frontage, kikuya flats, fruit trees, two springs, gravity-fed water to old house and dairy. No power, phone on. Dams with fish. Good fences. Surrounded by 4,500 ha rainforest, 100 acres cleared, 200 acres bush. No chemicals used. Price $160,000 ONO.

Ring (070) 94 1220. L. Stevenson, PO Box 128, Mt Molloy, Nth Qld, 4880.

I am a fully qualified naturopath with five years clinical experience in a large Australian healing centre. Shortly I would like to move my wife and family (wife & four children) to a rural property and exchange my skills for accommodation. We have strong Christian beliefs (unorthodox), but get on well with all real people. We have a fully equipped dispensary and can assist in home-birthings and natural therapies including chiropractic, hydrotherapy and dental treatments.

For further information, please contact Abundant Life Fellowship, PO Box 662, Coffs Harbour, NSW, 2450.

One hectare, plus quarter share of 42 ha of secluded property, 13 km by sealed road from Grafton, NSW. Power, phone and building permit available. School bus handy. Laundry and shower on site. Suit family intended to reside on property. Price $10,500.

John Vukovich, PO Box 160, South Grafton, NSW, 2461.

Billen Cliffs is a 321 ha Multiple Occupancy Community near Lismore and Kyogle in north-east NSW. Forty families are now resident and the near future will see a village of over 100 families. The central point of this pioneering development is a house and 2 acres with power, phone and water suitable to use as a General Store, restaurant or other commercial venture, and residence. The community is ready now for someone with initiative and enterprise who desires not only to live in the country in an alternative culture, but is keen to be self-employed. Valued at $39,000.

All enquiries to Don Tilbury, PO Box 895, Lismore, NSW, 2480. Phone: (066) 33 7147.

The Two Waters Farm, 5 km Upper Clarence River and Pretty Gully River frontages. Fishing, swimming, frost-free slopes, rainforest, pastures, still has a few 100 acre allotments available. Price $31,500 including fences and cooperative fund.

Enquiries, Maurice Moure, The Two Waters Farm, PO Box 63, Tabulum, NSW 2470.

For sale near Beaufort, Victoria. One block, approx 42 acres, of mature bush with spectacular views, ideal dam sites, some small cleared areas, no fencing. Land adjoins State Forest and is next to a group of four families with young children. Price $21,000.

Phone or write to Kevin Parker, 67 Research — Warrandyte Road, Research, Victoria 3095. Phone (03) 437 1943.

Dear People, we have for sale one share in the mountains, with creeks, 30 miles west of Eden, NSW. Small cabin, levelled house site, garage, basalt stones with good cleveage, contour road to quarry, dam, scenic view of Letts Mountain, easy access, 10 acres cleared around cabin. DA has been applied for Price $11,000.

Phone Tony & Deborah Boller, (0649) 67197, or write 'Two Creeks', Towamba, NSW 2550.

For sale regretfully due transfer. Bush block, 36 acres freehold. Suit person seeking seclusion or private reserve. Quiet, very sheltered plateau at far end of valley with streams and adjoining State Forest. Located at Kaiata, Greymouth. Nearest resident 2 miles. Offers $NZ 20,000 and over considered.

K. Everett, PO Box 16, Shannon, New Zealand.

Bushland retreat, 300 acres only 2½ hours from Melbourne. Adjoins the Grampians National Park. Almost entirely covered by light to dense forest. Rocky outcrops and gentle to steep slopes. Close to power and excellent road to the block. Deep black loam and clay soils suitable for mudbricks. Price $46,000 ONO.

Charles Chapman, 24 Sherbrook Street, North Eltham, Victoria 3095. Phone (03) 439 6460.

Share in 275 acres community farm at Warwick, Queensland. Three-bedroom mudbrick house on 1 hectare. Slow combustion stove, power, telephone, septic, rainwater tanks and pumps. Permanent creek. Lovely views in quiet valley. Use of tractor and implements. Price $39,500.

Malcolm and Cathy Roach, 49a Stephen Street, Toowoomba, Qld, 4350. Phone: (076) 32 2176.

My nearest neighbour lived about ¼ mile from me and recently has left the district. The old house where he lived is badly in need of some TLC. However, for someone with imagination and a strong heart, the place could be made very comfortable. I have access to the house and would like to arrange a long lease to an Earth Garden lady, preferably a 'supporting mother', rent $5.00 per week. There is good soil and plenty of water as it is on the bank of a creek (never floods), but the electricity has been disconnected. The house is little more than four walls and a roof, grape vines, water tank and fruit trees. School bus nearby.

Anyone interested could write to me, Graham Roberts, 'Swallowfields', Gungal, NSW, 2333.

For sale: Mid north coast, 24 acres, 45 mins from Kempsey, looking for a loving owner. Twenty acres thick forest, 4 acres pasture, gentle slope facing north, creek frontage. Established dam, gravity feed to building site. Situated on Taylors Arm-Millbank Road, near The Brothers Mountain. Good access and friendly neighbours. Price $35,000.

Max & Alison Elliott, 30 Richmond Avenue, Willoughby, NSW 2068. Phone (02) 955 181.

Share for sale on Far North Coast NSW in small community on 800 acres, mainly bushland, close to Woodburn and coast. Share consists of 4-bedroom homestead on 10 acres, large working shed, generator, greenhouse, above ground swimming pool, various fruit trees. Unique legal structure. Aim to live in peace and harmony. No illegal drugs. Price $72,500 ONO.

Please write to Rosemary Zillig, PO Box 8, Woodburn, NSW, 2472, or phone: (066) 82 2365.

Shareholders wanted to live in community being formed on 257 acres in Kangaroo Valley, NSW. Women, children and families wishing to settle encouraged. Shares $14,000. Outward looking, partially sustaining community envisaged. Currently preparing a Multiple Occupancy application and management plan for protection and development of the varying aspects of the land.

Contact Andrew Solomon, 61 Bellevue Street, Glebe, NSW, 2037, phone: (02) 692 9225, Dee McShan, 26 Christie Street, St Leonards, NSW, 2065, phone: (02) 439 8383 or Trish Cloud, C/- PO Kangaroo Valley, NSW, 2577, phone: (044) 65 1034.

We are a young couple with one child seeking around 10 acres in NW Tasmania, or people to join us to purchase a larger block on a share basis. We want to build in mudbrick and favour virgin bush or partly-cleared land. Some trees, please!

Paul & Anne Lawton, C/-PO, South Riana, Tasmania, 7316. Phone: (004) 37 6296.

With regret, we are selling our house in beautiful Buchan, Victoria. It is a two-bedroom fully-restored weatherboard on 1¼ acres with two separate titles. All services connected, solid fuel heating, 36 fruit trees, kitchen garden, double garage, workshop, carport, shed. Ideal for retirement or self-sufficiency. Price $46,000 negotiable.

D. & I. Whiting, 92 Benny Avenue, Port Noarlunga, SA, 5167. Phone: (08) 384 7230.

We are a family of three — Trev, Fiona and Bodhi (16 months) — looking for a place to live in our van; or to rent or caretake, within 5 hours of Sydney, while we save for our land and complete studies in Naturopathy. We are vegetarians with a spiritual and practical outlook and seek similar people with children in a mutually supportive environment. We're also willing to work or lend a hand as needed. Hope to hear from someone soon.

Trevor and Fiona Male, 35 Park Street, Pimlico, Qld, 4812. Phone us on (077) 79 7091.

Community unit for sale: 'Auchendarroch', Mt Barker, South Australia. Large 4-bedroom self-contained, alongside six other families. Set in 5 acres beautifully kept garden. Share in co-operative lifestyle and the ownership of an historic property. Close to schools, shops, transport. Other rooms and units available. No Strata title. Price $88,000 ONO.

Bill & Celia Carter, 'Auchendarroch', Adelaide Road, Mt Barker, SA, 5251. Phone: (08) 391 0907, business (08) 391 1550.

Tuntable Falls, Nimbin. For sale, large attractive timber house on Co-ordination Co-op. Features leadlights, verandahs, Rayburn slow combustion stove, spring/tank water, septic, workshop 12V power with access to mains, phone, 2 acres of established orchards and vegetable and house gardens. Owner must join Co-op, which has its own pre-school, school and shop set in beautiful valley surrounded by forest. No cats or dogs. Price $42,000.

Contact G. Meltzer, 41 Dell Road, St Lucia, Qld, 4067, or phone: (07) 870 2090.

For sale, 5 acres near Emerald, Victoria, organically farmed for the past 7 years, ¾ cleared, intermittent creek. Hugh no-dig vegie garden, fruit and nut trees. Numerous sheds, sheepyards. Two-bedroom house in very good order, all electric, open fireplace. Mains water, 3 km from schools, 1.5 km store. Price $108,000.

Contact Jill and Richard Whitford, Macclesfield Road, Avonsleigh, Victoria, 3782. Phone: (059) 68 4657.

Can you take country life? Farm sitter required for two weeks at Christmas 1986. Basic accommodation, 2 km from beach. Need to cut grass, do some watering. No pets please.

Contact J. & M. Tedder, Pavans Road, Grassy Head, via Stuarts Point, NSW, 2441. Phone: (065) 69 0802.

For sale, 15 acres of slightly undulating land, sandstone country, fenced, plenty of good shade trees, mostly box. Situated 15 km from Killarney. Access to permanent creek. Power and phone along fenceline. Local primary school, Price $25,000.

J. & H. Wilson, M/S 508, Tuckers Road, Danderoo, Qld, 4370. Phone: (076) 64 4224.

The Lillifield Community consists of 300 acres of beautiful, peaceful bushland at Lillian Rock in the Murwillumbah, Lismore, Kyogle triangle. It has easy access for all vehicles. It is an incorporated company and each of the 40 members has entitlement to about 5 acres with right of resale. Members share in another 100 acres which is available to all for recreation, forestry, agriculture, etc. The road system is now fully established and all dams have been completed. Building of homes has commenced. The present 11 members are looking for more people to help further development of the community. The share price of $12,800 includes the first Annual Service Fee ($300) as well as the cost of roads, dams and equipment to maintain them. Please phone and arrange for us to meet you where convenient in the area to show you Lillifield.

Our phone number is (066) 89 7224, or you may prefer to write to "Lillifield", Lillian Rock, via Nimbin, NSW, 2480.

Breeding Poll Herefords

Graham Roberts and his son Matt outside their stone cottage.

By Graham Roberts,
Beau Ideal Poll Hereford Stud, Gungal, NSW

One way to make it possible to live in the country on a relatively small acreage and be able to expect a reasonable standard of income is to specialise in some agricultural commodity by intensification of available resources.

When Matt and I first came here to 'Swallowfields' at Giants Creek, near Gungal, NSW (see **Earth Garden 43**), we were city folk, with only a small knowledge of agriculture and animal husbandry. We have had to educate ourselves to be able to survive in a rural environment by reading books, asking questions, attending Field Days and Seminars and above all trying to learn from other people with more knowledge than ourselves.

We live in the beautiful Hunter Valley, so the main agriculture in this area is viticulture (growing wine grapes), beef cattle and wheat growing. Our property is not suitable for wheat growing or commercial cattle raising, so we are concentrating on growing grapes and developing a Poll Hereford Stud.

Five years ago, we purchased our foundation herd of females from the Reflection Poll Hereford Stud at Manilla, NSW. These first seven cows were all of one family, tracing back to the famous 'Killdrummie' blood line and are all magnificent examples of the breed. When we bought them they were all in calf to a bull named 'Baldrugery Liberty 18', who was the Brisbane Grand Champion, so we were able to expect some excellent calves. The first calves born from these cows were four heifers and three bull calves. These heifers have now become mothers themselves, making us feel very much like proud 'grandparents'. We have since purchased cows from Baldrugery Poll Hereford Stud and Dalkeith Poll Hereford Stud and our own herd now has 40 breeding females.

It requires a lot of dedication and commitment to develop a cattle stud and the lack of a business background could be a disadvantage. Stud cattle breeding requires keeping accurate records and complete control over the herd. It is important to have good fencing and proper facilities for handling cattle. Having been in business for myself for over 30 years, I felt I had the right temperament to qualify for this venture because it requires a certain amount of expertise to develop a sales market.

In ordinary commercial cattle breeding there is always a market, the saleyards or the local fat or store cattle buyer, for any animals produced. It doesn't really matter if you are surrounded by other producers, hence it is virtually a non-competitive market. However, with stud cattle there is a lot of competition for sales, so you have to be prepared to develop a keen business sales sense. This might be in conflict with the philosophy of many Earth Gardeners, so you might find you need to explore the justification carefully.

I have found that I still need the stimulation and the challenge that this venture affords me and balance this by being able to live my rural life very much as I want to do. Here at 'Swallowfields' we believe that good, healthy cattle can only be produced on good organic pasture. Most readers know the saying, 'We are what we eat', so if it is good enough for us, then why not for our four-legged friends? To develop our organic pastures we have adopted the Keyline system developed by the late P. A. Yeomans and have proved its merit by doubling the carrying capacity of our land.

We use a seven-tyne vibrating plough coupled to a 65 HP Belarous tractor and break the ground to a depth of about 17 cm (7 inches). This allows the air and moisture to penetrate into the hard-packed earth, any moisture is captured and the vegetation decays. In time this produces good black soil. We have planted a variety of different grasses and legumes, resulting in excellent pastures for our cattle. The soil here is very acid, so we have used some superphosphate to start fertility. We hope we will only need the one application and that after this 'starter' the soil will develop its fertility by the natural process of decaying vegetation and moisture, encouraging our friends the earthworms to habitate and flourish.

It is an exacting procedure to be able to produce the type of seed stock cattle required by the cattle industry. Cattle breeding is a continuous process of compromise and correction, with the fastest progress being made by correcting as few traits as possible at the one time. It is generally necessary to accept some minor faults to gain strength where you really want it.

Perhaps we should consider what market we wish to supply and what bulls are needed to do this. The local market is generally the most reliable and is always there. Prime lightweight cattle generally sell very well and if we decided to attract this market, certain attributes are required in the sires we use. We select our sires by looking at the progeny they produce, then mostly using artificial insemination (AI), mate the cows to bulls that we think can make the greatest gain in our calves. We have purchased a one-quarter share in a bull named 'Baldry Martie' from the Baldugery Stud. Martie is a magnificent fellow and we are now getting the first of his calves on the ground. We are hoping Martie's influence over the herd will be one of general improvement.

Once again it is difficult to remain a purist, in this case by using bulls for the traditional natural service. In a modern cattle stud you must use the genetic pool available through AI, otherwise you cannot compete with the type of animals that are available from other more established studs.

Another important aspect of stud breeding is showing. This can absorb a lot of time and effort, so if you are not prepared to do this my advice is not to go into business. We get a great deal of pleasure preparing our show team, as you are constantly with the animals, teaching them to lead, grooming them and generally caring for their welfare. Cattle, like most creatures, soon respond to kindness. We are always quiet and talk quietly to them. We always lock up the dogs when the cattle are being groomed and washed. A good bit of advice is to keep dogs away from cows with calves, which can get very upset and become quite dangerous.

Before we started the stud we looked into many types of cattle to breed and finally, after lots of investigation, we came up with the following points that persuaded us to breed Poll Herefords:

1. They are very attractive cattle.
2. They have the backing of the largest beef cattle Society in Australia. Being eligible to become a member of the Poll Hereford Society Ltd and being involved in its affairs, introduces us to a fraternity of generally good people who are bound together by a common interest. Matt and I have made new friends from all over Australia, which has given us great pleasure.
3. We believe there is no place for horned cattle. Horned cattle have been banned in New Zealand and from live judging carcase competition in NSW.

Another reason for choosing Polls is that to grow horns on cattle and then cut them off seems unproductive and cruel. It costs good protein feed to grow horns including the bone inside, about 10 kg of grass to grow 1 kg of horn. We think horned animals are more aggressive and need more maintenance. They take up more room in trucks, yards and feedlots, bruise each other and anyone in the way. They are more likely to cause accidents and therefore make workers' compensation premiums higher.

Mixing horn and poll cattle is cruel. Tipping horns is only half an answer and just as painful. This is usually done when cattle are old and have put good feed into growing horns. You can have 3 kg of meat for 1 kg of horns as well as more docile cattle which are safer to handle and cheaper to freight.

4. Poll Herefords are the breed butchers are prepared to pay an extra premium for, because they know how to get the highest dress-out percentage.

They are recognised by restockers, who will pay an extra premium for them because they know they will 'do' in all climates and have the ability to forage under all conditions. They will also recover quickly after drought.

5. They are cattle with a good record in hoof and carcase competitions and are available everywhere in Australia.

'Baldry Martie', sire to a new generation of Poll Herefords.

Another fact in their favour is that Poll Herefords are becoming more popular each year.

I am aware that a lot of E.G. readers are vegetarians and would say, "Well, why breed cattle in the first place?". My reply is that I believe that everyone should eat some red meat as it is not otherwise easy to get the type of stamina required for hard physical work. I have tried being a total vegetarian and found that my physical strength decreased. I now eat red meat in moderation or whenever my body tells me to do so.

Beau Ideal Poll Hereford Stud is our method of surviving in the bush. Being middle-aged and educated in the School of Hard Knocks, I am prepared to reach a compromise with myself and develop a lifestyle that is stimulating, productive, healthy and, importantly, income producing.

I do not believe that making money is the 'be all and end all', but to be a realist, you must have enough money to be able to support the life you choose and be totally independent of Government support whenever possible. This can be a challenge in itself. I believe many young people can use the Government to subsidise their income while they are getting themselves established and then in turn pay the Government back by maybe making a job opportunity for someone else in the future.

When you consider that agriculture by European methods in Australia is not yet 200 years old, this is not a long period in terms of generations of farmers. I believe that the sensitive thinking newcomer to the rural scene is of the greatest importance to this country. Today's New Settlers are generally more interested in the environment and the ecology and are not bound by the old traditional 'scorched earth' policy that has left so many parts of this country devastated. When people come into the country and make the land productive for themselves, it follows that future generations can only benefit from that work and thoughtfulness. When it is all said and done, all of us are merely 'caretakers' of the land in our lifetime.

My hope is that 'Swallowfields' and Beau Ideal Stud will be our way of making a contribution to the future by perhaps supporting hard-working people who enjoy the pleasure of rural life on land that had not been very productive before Matt and I moved in.

Stop press: 'Baldry Coral 60', a 12-month-old Poll Hereford heifer was sold for $50,000, believed to be a record price for a Poll Hereford heifer of that age. Unfortunately, we didn't own her!

Housing ducks & hens

By Sister Helen

Broody house & hospital

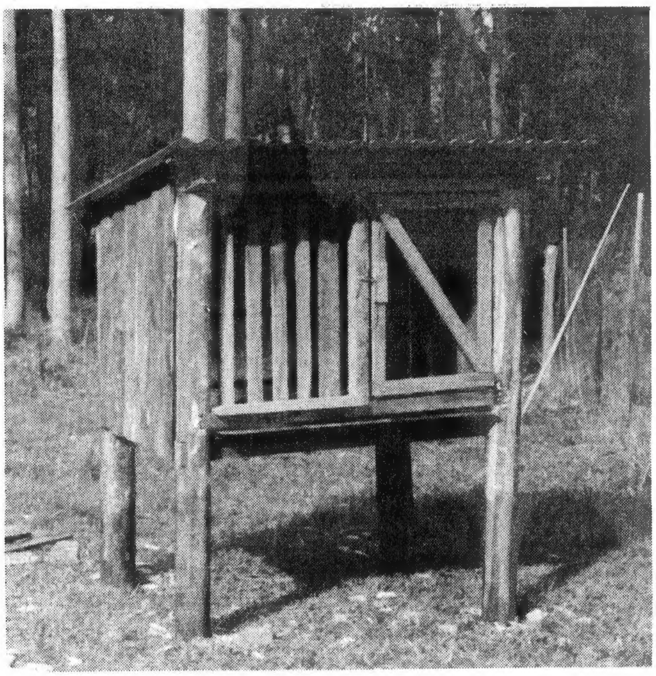
Last year we built a fairly conventional broody house for our hens when they showed signs of going broody when we wanted them to keep on laying.

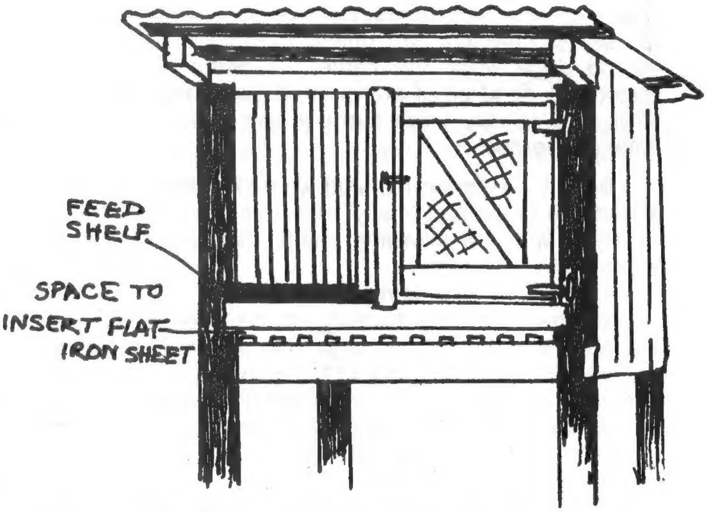
The floor was slatted to allow a draught of air undeneath them so that sitting would be uncomfortable (though some of our stubborn hens still managed to sit on the narrow boards!).

To make the house more useful we allowed for a narrow gap in the front above the floor so that a piece of galvanised flat iron, cut to size, could be slid in over the floor. On this we placed sheets of newspaper. Any sick hen, or one we wished to isolate for any reason could then be placed inside.

If the hen should die, then the newspaper plus droppings (and hen if necessary) could be easily removed and burnt. The iron could be pulled out and also easily disinfected.

Food and water are placed on a shelf protruding from the front of the broody house.





Mudbrick duck house

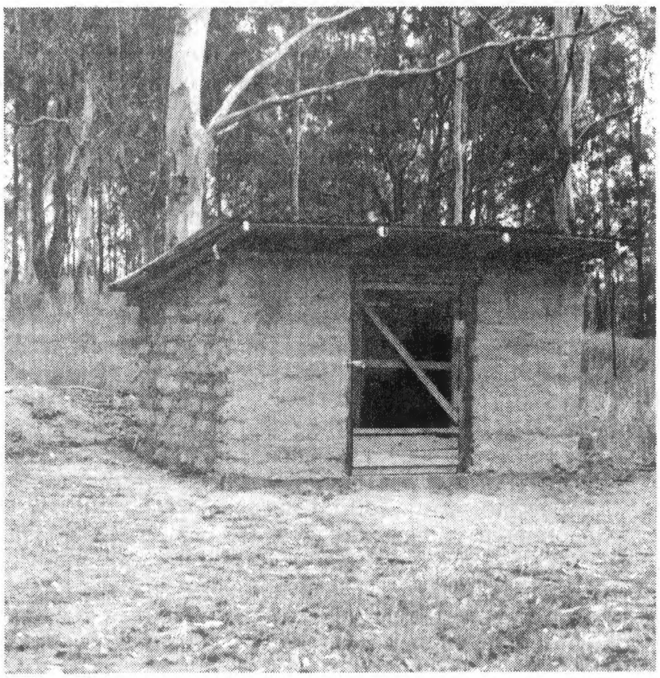
We built a duck house of mudbricks on concrete footings. The floor is dirt, covered by dry grass which is periodically forked out, manure and all, and used as mulch around the fruit trees.

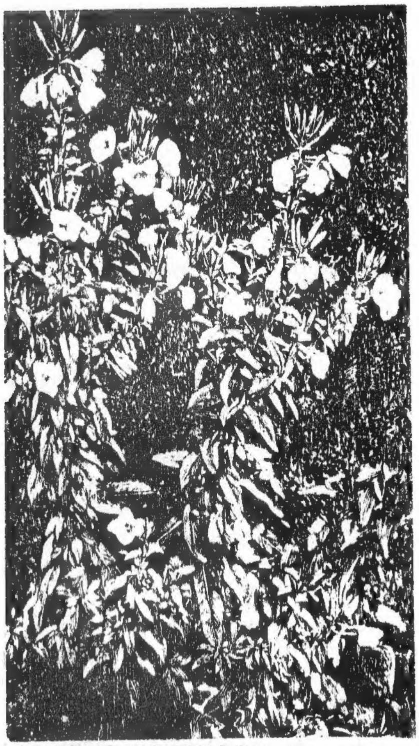
We have added an extension to one side of this building to provide a separate house for ducklings.

The mudbrick is cooler than iron and so better for ducks.

The duck house is now surrounded by a wire netting fence and is situated near a dam where the ducks swim each day. We have five Khaki Campbell ducks, one drake and two Mallard ducks.

Sister Helen, of the Sisters of the Church at Dondingalong, NSW, wrote on calf shed and cowbail shelters in Earth Garden No 48.





> **No evening scents, I think, have the fascination of the delicate fragrance of the evening primroses, especially that of the commonest variety. Those pale moons irradiate the twilight with their sweet elusive perfumes. Like the flowers themselves their scent as night draws in becomes full of mystery and holds our imagination captive.**
>
> **ELEANOUR SINCLAIR RHODE, *The Scented Garden*, 1931.**

EVENING PRIMROSE *(Oenothera biennis)*

By John J. Alderson

The evening primrose belongs to the natural order *Onagacea*. The Onothera, though widely dissimilar, are closely related to the fuchsias, the water chestnut *(Trapa nutans)* and the Willow Herbs. There are a number of Onotheras, but most of them appear to be varieties of *biennis*.

It is an American species and was introduced into Europe from Virginia in 1614, first into Italy, from which it has spread over Europe and is now naturalised in the United Kingdom. John Gerard (1633) mentions it being in many gardens in England. It probably spread from the UK to New Zealand and Australia, where it is now well established.

Though usually seen growing in the open, the evening primrose is actually an under-herb or shrub and hence should flourish under trees. The large golden flowers open in the evening or night and are highly fragrant, being fertilised by night insects, particularly moths.

The name is derived from *oinos* (wine) and *thera* (hunt), due to the roots, when eaten after dinner, inciting to wine drinking. It is also known as Tree Primrose, King's cure-all, Sundrops and Scabish. It is not related to the primrose proper, which is a primula.

Description. The root, which somewhat resembles a carrot, though shorter, is red or yellowish and white within. It is fleshy and tender, though fibrous. It is a biennial. In the first year there are many obtuse leaves lying flat on the ground. In the second year a stalk grows to one metre or more in height (though in Australia usually only half of that). The leaves are alternate, lanceolate, 8-12 cm long and 2 cm wide, pointed with nearly entire margins and covered with short hairs. The flowers are yellow (sometimes red or purple) on either axillary or terminal spikes or racemes.

The earliest flowers bloom in early December and the spike keeps growing and there is a succession of flowers well into autumn providing a magnificent massed display. The calyx-tude is prolonged above the ovary and four-lobed at the top. There are four petals and eight stamens, the ovary and capsule is four-celled. The style is distinct with a capitate of four-lobed stigma. The seeds are numerous and quite small.

Medical use. Despite the suggestive name King's cure-all, the evening primrose has been little used, but it does suggest that there are values in the herb that are now forgotten. It is an astringent, mucilaginous and sedative and has been used for the treatment of gastro-intestinal disorders of a functional origin, asthma and whooping cough. It is used for ordinary coughs and for skin eruptions, small cuts and inflammations. It has been used in dyspepsia, torpor of the liver and for some female complaints such as pelvic fullness.

Veterinary uses. Evening primrose is used for the treatment of coughs, sore throats, wounds, skin irritations and all inflammations. The dose is two tablespoons of the flower steeped in a large cup of boiling water. For external application pound up a small handful of flowers and mix with egg whites.

Preparation of the herb. The bark and roots are chiefly used. They are collected in the plant's second year when the flower stalks begin to appear. The bark is peeled from the flower stems and the leaves removed and both dried and preserved.

Culinary use. The root, which resembles a small carrot, can be eaten either raw or cooked. The roots are raised in the spring before the flower stalks begin to grow. The French use them for garnishing salads and it is sometimes eaten after meals to encourage wine drinking in much the same way as olives. It is said that the young leaves and shoots are also used in salads. Otherwise the roots are used in soups or as a boiled vegetable. It must be added that the Cribbs have missed the evening primrose in their *Wild Food in Australia* (Collins).

The flowers should make a good flower wine but the writer's efforts in this regard were not exciting, possibly due to not using enough of the flowers. The probable quantity would be half a gallon of flowers to make a gallon of wine (see John J. Alderson's *Adventures in wine* in Earth Garden No. 11).

Cultivation. The evening primrose is very hardy and will thrive almost anywhere. In fact it is classed as a weed. As mentioned above, it is an under-plant, though said to prefer a warm, sunny position and a good sandy soil. The seeds should be sown in a shady position in autumn and transplanted when a couple of centimetres high and placed 7-8 cm apart, and in spring or the following autumn transplanted into their permanent positions. As they are deep-rooted, great care is needed when transplanting. However, unless mass effects are wanted it is only necessary to introduce the plants and allow to seed down and you have a permanent crop of evening primroses in the garden, probably flourishing best among your lettuces and phlox!

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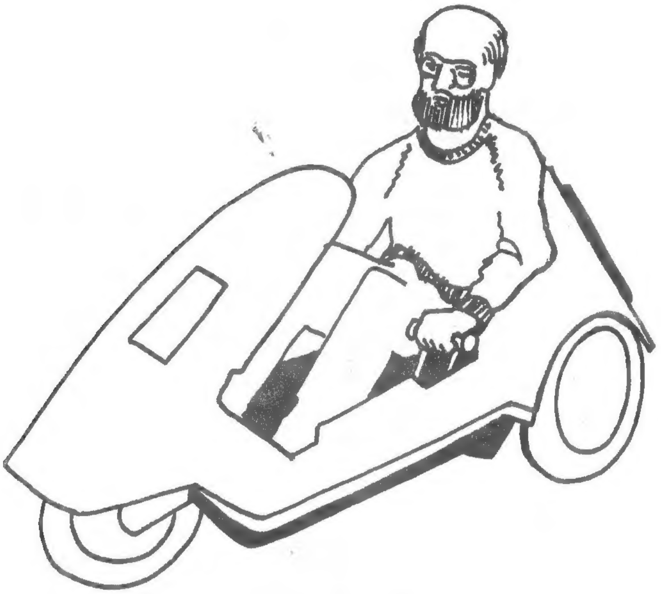
ENERGY PULSE . . . ENERGY PULSE . . . ENERGY PULSE . . .



PROSPECTS FOR SOLAR TRANSPORT

From the 1930s until recently, delivery vans from Harrod's famous department store in London's Knightsbridge demonstrated how quietly and efficiently electric engines running on nickel cadmium batteries could function (despite a lot of stopping and starting in traffic on the way to Buckingham Palace or Hampstead Heath). Some 27,000 milk delivery floats in Britain are battery operated, as are fork lift trucks throughout the world.

Batteries for these vehicles are recharged from mains electricity or battery chargers, but if a vehicle will run on low voltage DC electricity its batteries can be charged directly from solar cells. It's easy to envisage a garage rooftop solar array charging the battery bank of a small electric runabout like the *C5 battery powered tricycle* (illustrated), invented by British computer magnate Sir Clive Sinclair. The trike is ideal for shopping, but its batteries are always running down on the road, so it could be fitted with a solar module canopy similar to Ruth Cilento's *solar tricycle* (Earth Garden 28) or *the BP Quiet Achiever* (Earth Garden 44). Plug in street solar power poles at parking meters are another possibility.

In the United States, the two-passenger *CityCar* has a 3.5 HP General Electric 24V DC electric motor run from 8 x 6V batteries. It has a built-in charger and a range of 120 km. At the moment, the initiative for developing a commercial solar vehicle rests with a group at a Tokyo University which is testing a fourth generation solar mini car which runs from batteries charged by a solar cell array and has a speed of 80 kph and a range of 110 km.

One future development could be the use of thin flexible amorphous silicon or gallium arsenide solar cells moulded to cover a car rooftop, which then becomes the energy source for the electric motor. We have the sunshine, so the prospects for pollution-free transport — running on sunlight — are promising for Australia.

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The catalogue and price list, certainly the most comprehensive in this field in Australia, is $3.00 posted from Self Suffiency Supplies Pty Ltd, Shop 3, Cnr Clyde & Forth Streets, Kempsey, NSW, 2440.

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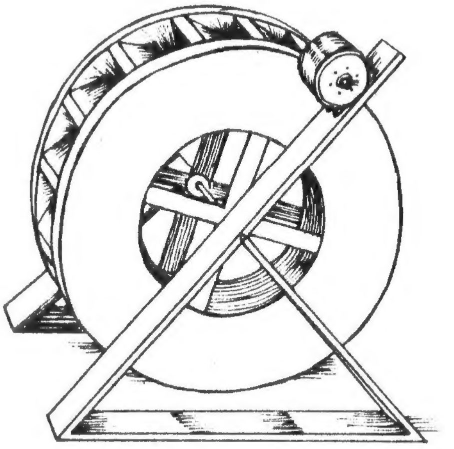
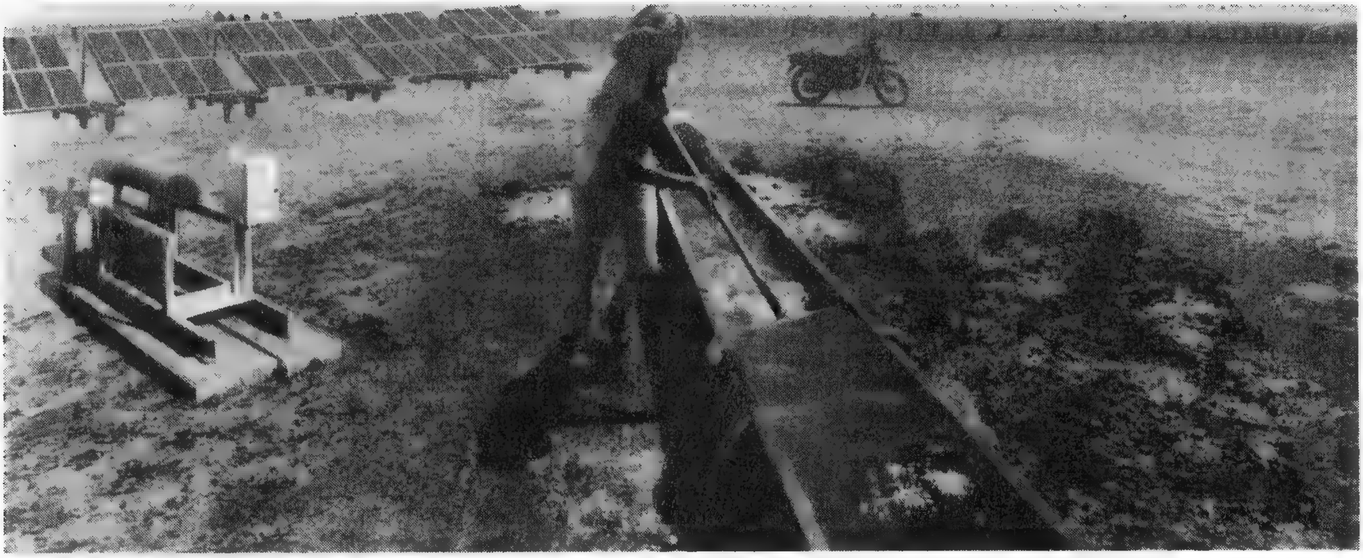
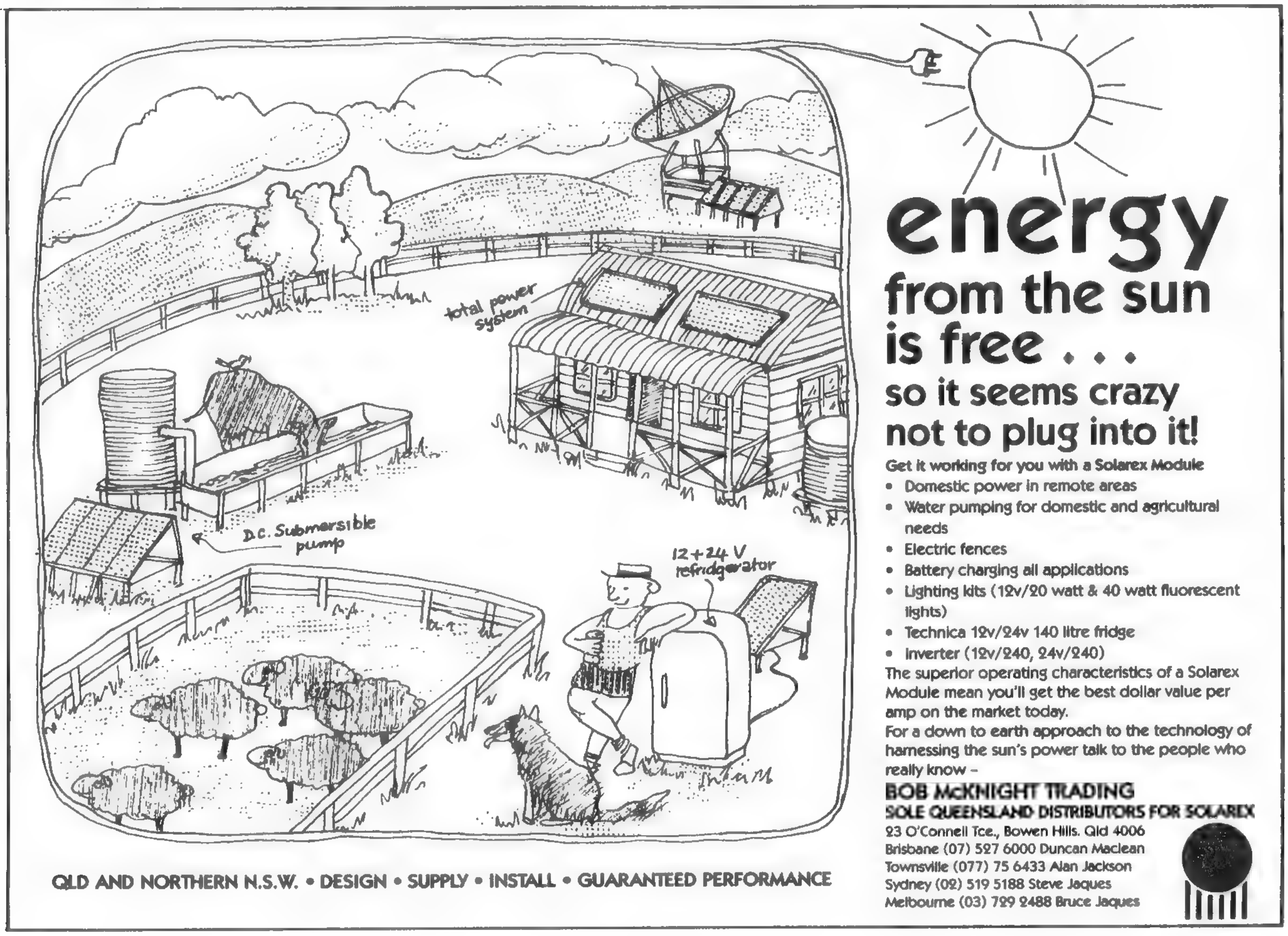




This Mono/Suntron solar water pumping system, linking 8 solar modules and a Mono P301 DC borehole pump via a sophisticated electronic controller called an MPPT (maximum power point tracker), supplies water for stock on a cattle property in the north of Western Australia. The system can pump 25,000 litres of water per day in the north (slightly less in southern areas), has a maximum useful head of 70 metres and can handle silt-laden and sandy water.

Average daily efficiencies of the system are around 4.5%, which compares with the World Bank benchmark figure of 3.8% for solar pumps established after tests in 1983. Mono Pumps (Aust) Pty Ltd and Suntron Energy Co now jointly manufacture a range of solar electric pumps designed for conditions in Australia. Further information from Susan Saunders, managing director, Suntron Energy Co Pty Ltd, 861 Doncaster Road, Doncaster East, Victoria, 3109.



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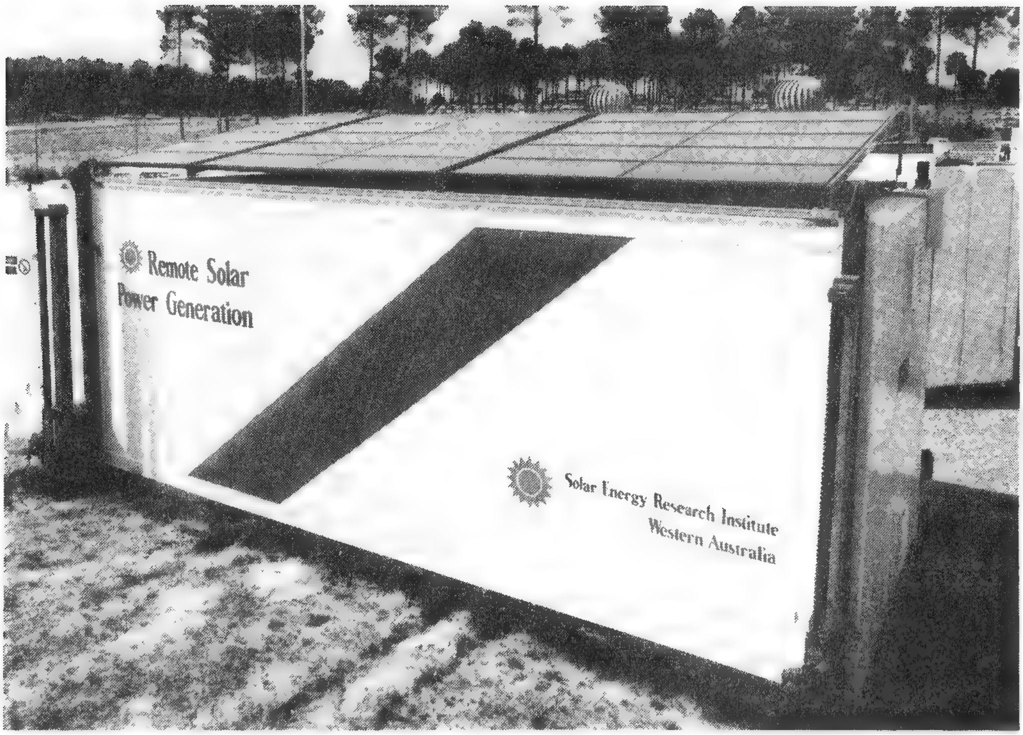

THE SOLAR PACK

Only 8% of the vast arid State of Western Australia (three times the size of Texas) is connected to the authority electricity grid, making the supply of energy to remote places difficult and costly. The usual solution is a generator set run on petrol or diesel fuel hauled over long distances.

The Solar Pack, developed by the Solar Energy Research Institute of Western Australia (SERIWA), can provide a more economic energy system which is easy to transport and set up at remote communities.

It consists of an insulated 6 metre shipping container which shelters a battery bank, inverter, fluorescent lights and four refrigerator-freezers and is powered by a roof-mounted solar cell array. The unit also powers a television/video cassette recorder and a VHF transceiver for communications with the Royal Flying Doctor Service. Water supply pumps may be added where needed.

In this paper given at the Science, Technology and Aboriginal Development Workshop at Alice Springs, Northern Territory, in 1985, Mr W. L. James of SERIWA describes the prototype Energy Pack set up for the Ngurawaana Aboriginal Community campsite near Millstream in the Pilbara of Western Australia and reports on its performance so far.

SERIWA is preparing a second unit which will be located at the Punmu Aboriginal Community near Lake Dora, 500 km east-south-east of Port Hedland and has received a grant from the National Energy Research Development and Demonstration Council to continue its work in this area.

We understand the Energy Pack units could be sold for around $30,000 if commercial production goes ahead. Further information from SERIWA, Box R1283, GPO, Perth, WA, 6001.

SOLAR POWERED SERVICES FOR REMOTE ABORIGINAL COMMUNITIES

By W. L. James, Solar Energy Research Institute of WA

Abstract. This project describes the design and construction of a mobile solar powered service system for small, remote Aboriginal communities in Australia. The services are incorporated in a 6 metre shipping container and include radio communication, water pumping, refrigeration, outdoor lighting and power for the operation of small power tools, TV and video recorder.

The first system was installed for the Ngurawaana Community in Western Australia and has been operating flawlessly since March 1985.

The community has readily accepted the system.

Introduction. Aboriginal communities in Western Australia, South Australia and the Northern Territory have been moving back into their traditional homelands since the 1970s. Their election to move away from townships and large communities has created a need for basic services.

Townships and remote Aboriginal communities in Western Australia are presently powered by diesel generator sets operated and maintained under supervision of the State-owned utility.

The maintenance of equipment and the transport of fuel to some of these townships and communities is difficult and costly due to the large distances involved, the rough terrain and extreme weather conditions.

The dispersion of Aboriginal groups into smaller settlements, moving to even more remote areas has made the utilities, Aboriginal groups and administrative authorities search for more practical solutions.

The State Energy Commission of Western Australia and the Department of Aboriginal Affairs approached the

Solar Energy Research Institute of Western Australia (SERIWA) to see if solar energy could prove a viable option. Afer several meetings with community representatives and advisors, it was concluded that it would be practical to design a solar powered system that could provide basic services rather than just electric power. These service systems had to be relatively mobile as the communities are, by nature, nomadic.

A list of basic services for immediate consideration was established.

(a) Communications. The provision of reliable power to VHF transceivers for communicating with the Flying Doctor and other vital services.

(b) Water. The provison of pumping facilities to maintain existing potable water storage.

(c) Refrigeration. Provision of chilled and frozen storage for bulk meat, vegetables and dairy products. Refrigeration could also be used for storage of medication, vaccines, etc.

(d) Lighting. Provision for area lighting.

(e) Battery charging. For the charging of batteries for vehicles.

(f) TV/video. Provision of power for a communal TV/video set.

System description. The prototype Solar Pack consists of a centralised facility based on an insulated cargo container with a roof-mounted photovoltaic array (see photo). The container forms a robust, transportable shelter for the associated electrical equipment.

The photovoltaic array is fixed to the roof of the container and consists of 750 watt (W) of ribbon solar cells made by Mobil Solar Corporation. The container also holds a 19 kilowatt hour (kWh) battery bank. The batteries are Dunlop lead-acid, tubular traction type. System voltage is 24V DC.

An electronic controller prevents overcharging of the battery bank during periods of excess solar radiation while also ensuring that non-essential loads are disconnected during periods of poor solar radiation.

The prototype Solar Pack provides the following services:

Communications. The system provides DC power to a 100W VHF transceiver. This facility replaces the existing low power transceiver already in use within the community.

Refrigeration. The system supports four chest-type refrigeration units with a total capacity of 600 litres. One of them is a commercial unit designed for photovoltaic applications. This unit uses a single Danfoss compressor.

The remaining three units were custom designed and built to SERIWA's specifications. The 150 litre cabinet incorporates two identical Danfoss compressor units operating in tandem with a single thermostat. This doubling of the cooling capacity allows the unit to rapidly freeze a large joint of meat despite high ambient temperatures and provides security of supply in case of failure of one compressor-refrigeration system.

All the fridge cabinets are manufactured with high levels of insulation (minimum 75 mm of polyurethane) and hence exhibit improved efficiency compared to conventional domestic units.

The refrigeration equipment is configured as a refrigerator or freezer by presetting the thermostat. The prototype Solar Pack was configured wth 50% fridge and freezer capacity.

Lighting. Fluorescent lighting was provided in the form of 20W fittings which were modified to accept fluorescent inverters. This modification allows the fitting to operate directly from a 24V DC supply. Lighting was provided in the container itself, in an adjoining office building and outside nearby buildings.

AC loads. An inverter was provided to convert the low voltage DC power provided by the system to mains voltage AC power (240V-50Hz) for use with a conventional television, video recorder and small power tools. A mains powered battery charger provides charging for 12V automotive batteries.

The main power supply is provided in DC form to eliminate the reliability and efficiency problems of inverters, as well as to contain the use of large AC powered appliances, which is common practice when a diesel generator set is provided as a power supply. The uncontrolled increase in load generally ends up in an undersized diesel generator set or the selection of a large set which continually runs at low power level with the consequences of poor fuel efficiency and cylinder 'glazing'.

System performance. A member of the Ngurawaana Community arrived during the final week of construction to familiarise himself with the system and to assist with the final assembly. This proved to be a valuable experience as it has helped to establish a relationship with the parties concerned

The Solar Pack was tested at SERIWA's Solar Research Centre in Perth for a period of two months prior to delivery.

TABLE 1 — Load Estimates — Yearly Average

			Daily Load
(a)	Refrigeration		
	Total Capacity	600 l	2.5 to 3.5 kWh
	Compressor Power	380 W	
(b)	Lighting		
	Total Lighting 12 hours/day	80 W	1.0 kWh
(c)	Communications		
	Transmit Power 1 hour/day	100 W	0.1 kWh
(d)	AC loads		
	Average power	50 W	0.4 kWh
	TOTAL		4 to 5 kWh/day

The design loads for the system are described in **Table 1**. In order to test the system for daily energy delivery, a constant current load of 10 amps was placed on the system for a continuous period of five days corresponding to a total daily load of approximately 6 kWh. The system operated during this period without load shedding, despite maximum temperatures of 35-38°C. During this period, the battery voltage remained between 1.9V/cell and 2.3V/cell.

Instantaneous system performance can be monitored using the panel meters mounted on the front door of the controller enclosure. Normal array currents should range between 20-30 amps under 1 kW per square metre of solar radiation.

As can be seen from Table 1, the actual sustainable load is larger than the maximum design load and hence shedding should not occur except during extended periods (4-5 days) of poor solar radiation.

Transport of prototype. The completed power system was transported to the Ngurawaana Community campsite near Millstream, Western Australia, on March 8, 1985.

The main storage battery and refrigeration equipment are fixed permanently to the walls and floor of the container and hence can be transported without further modification. The internally mounted transceiver and inverter equipment are packaged separately and stored within the container for transport.

The container is normally mounted on two 4.5m lengths of 203 mm x 76 mm steel C-channels and bolted to the container sides to ensure stability in high wind speeds. During transport, these channels are stored within the container and are fixed to the floor.

In its operating position, the photovoltaic array extends the vertical height of the system approximately 500 mm above the container roof. If height is critical the array may be stowed parallel to the roof whereby the extra height is reduced to 100 mm. The overall height with the array extended is 3 metres.

The system is lifted using four manually operated container jacks. A truck with a 6 metre tray can be driven beneath the raised container with approximately 300 mm clearance between the tray and jacks on each side. The total weight of the system including container, jacks and support channels is 4800 kg.

Unloading is carried out in a similar fashion and takes a team of four about three hours to complete.

In transit, the Solar Pack was subjected to very rough roads and rocky terrain, during which the array was always in the extended operation position. On arrival, there was no apparent damage to any of the equipment. The refrigerators and freezers, although disconnected from the power supply, maintained the food frozen during the 2½ days travel time.

External cabling was installed between the container and the store building and a nearby dwelling. This external cabling operates the lighting and will allow the transceiver to be installed in the store building when required.

Installation time from truck arrival to test and operation of the Solar Pack was completed in one day. External underground wiring to a store and for outdoor lighting took two days due to the rocky terrain. Jack hammers had to be used for cable trenches.

The refrigeration equipment was configured at 300 litres of refrigerator and 300 litres of freezer space. The inverter was tested with hand tools and a television VCR and operated correctly. The transceiver was tested in the morning of March 11 during the scheduled transmission by the Royal Flying Doctor Service in Port Hedland (4030 kHz). The transceiver showed considerably improved transmission and reception performance compared to the existing 25W 12V set.

Mr Greg Tucker of the Ngurawaana Community was briefed on the operation of the system and arrangements were made for the periodic recording of system performance via the panel meters on the controller enclosure.

System operation. The system has operated continuously since installation in early March 1985. A weekly contact is made with the community and SERIWA via a radio telephone patch with the Royal Flying Doctor.

Panel meter readings, battery specific gravity and general weather and operating conditions are relayed. No abnormal readings have been noticed, the lowest specific gravity reading being 1180 which is above the 75% charge level of this type of battery. Only one high value of 29V at the battery has been recorded, at which time the controller switched the array off. This is a good indication that the array power is being well utilised and that the system sizing is adequate so far.

Battery electrolyte has been topped up only once in the first six month period.

The refrigerators and freezers are being well utilised with an average of three of the four units full. The freezers were designed to cope with fast freezing of freshly killed animals. A problem has occurred with the dripping of blood, which is a nuisance if plastic bags are not used. However, a regular cleaning of freezers is effected when running low on food.

Vegetables are being stored and consumed more regularly now. However, sometimes these have been put in the freezers rather than in the refrigerators and have been occasionally damaged by frost.

The general comment by the community is that they are happy with the system. Indications are that more area lighting would be desirable for the more distant dwellings.

TABLE 2: Photovoltaic System Costs

Photovoltaic array (750 Wpk)	7,500
Battery (800 Ah, 24V)	2,300
Electrical fittings	1,500
Refrigeration	5,660
Inverter	760
Transceiver and antenna	2,300
Container (second-hand)	1,600
Miscellaneous hardware	400
Labour (150 hours at $20 per hour)	3,000
TOTAL	$25,020

System economics. The costs of major system components are outlined in **Table 2.** A labour component of $3,000 has been included to represent the additional costs involved in commercial production. It should be noted that some component costs, especially those for refrigeration, could be reduced if the equipment was produced in larger quantities. However, profit margins necessary for a commercial production will increase the costs.

Only the power supply plant is considered in the economics as the rest of the system should remain the same.

Assuming the battery will require replacement after five years and the balance of the system after 20 years (with no residual capital value) then the annual running costs of the system would be approximately $0.97/kWh. This assumes an average energy delivery of 5 kWh/day and an interest rate on borrowed capital of 12%.

The existing variable load (180W average) is not compatible with conventional diesel-driven generation equipment. The smallest practical diesel generator size would be around 2 kW and hence would only be loaded to 10% of rated load for much of the time. A generator set operating under these conditions would exhibit extremely poor fuel efficiency (less than 1 kWh/litre for diesel) and corresponding poor reliablity.

A better alternative is the use of a petrol driven battery charger in conjunction with the existing battery bank. This would result in a cost of approximately $1.33/kWh. Clearly, the use of photovoltaics is the most economic solution.

The use of photovoltaics produces an immediate economic advantage compared to the petrol based system. This economic advantage will become more significant as the real cost of petrol increases in the future.

The solar system is environmentally benign as it is totally quiet in operation and eliminates the visual pollution created by fuel and oil drums.

The independence of the community is enhanced as it will not rely on fuel deliveries.

Conclusion. A photovoltaic power system has been constructed and deployed at the Ngurawaana Community campsite near Millstream, Western Australia.

The system provides reliable DC power to communication, refrigeration and lighting equipment and limited AC power for handtools, television and video equipment.

The system is easily transported and can withstand rugged road conditions without apparent damage to any of the equipment.

The solid container can withstand cyclonic weather conditions and could provide a temporary shelter when these occur.

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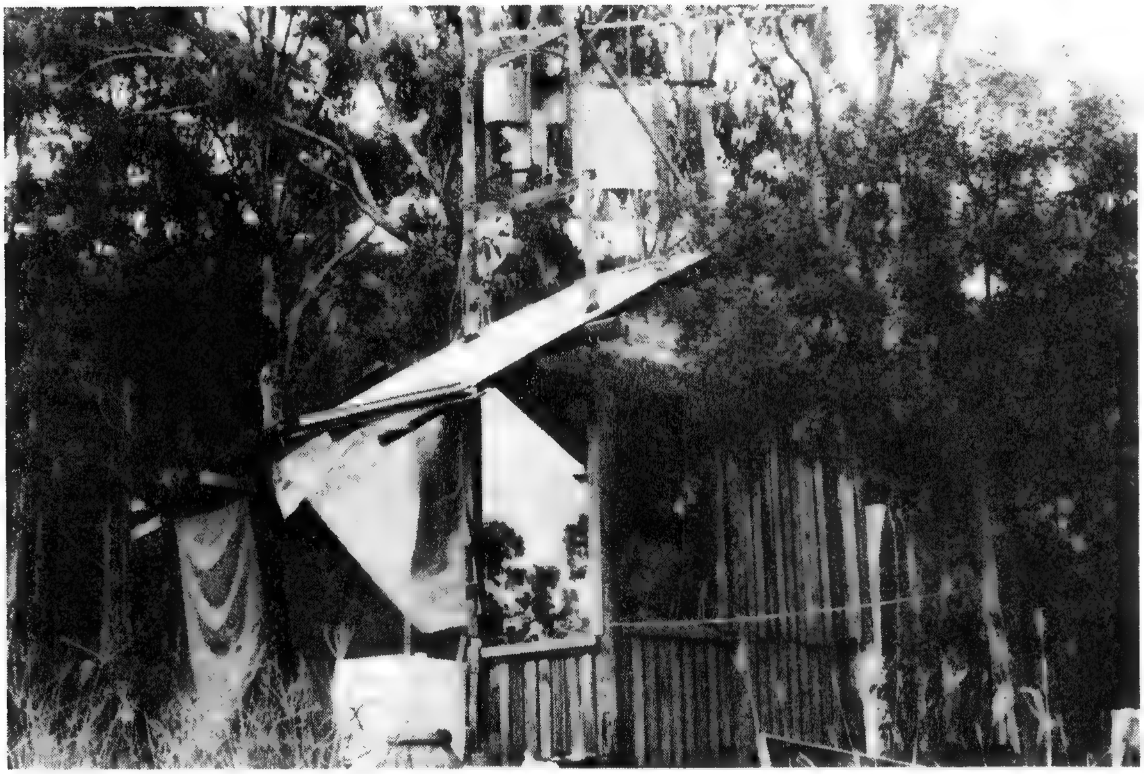


Doctor Who's famous TARDIS is small outside and usually assumes the shape of a British police box. Inside it's bigger and filled with flashing lights and computers, as befits the 'high tech' space/time machine of a Time Lord.

Peter van der Wyk's TARDIS, high on a ridge at Blue Knob, near Nimbin in northern New South Wales, is also small outside, but with its rooftop mounted bicycle wheel wind generators it looks more like a fantastic drawing by Heath Robinson or Bruce Petty, as befits an inventor and experimenter with soft technology.

There is the illusion of a bigger space inside and there are computers also, but these ones run on 6 volt and 12 volt power. In this article, Peter tells us some more about this self-contained power centre which is the first part of his 'expanded' home on a site to be known as Moon Base.

By Peter van der Wyk

I built the TARDIS to fulfil many functions at the same time and at a minimum cost.

I needed a tower on which to mount my wind generators which I carried over here from my previous home. I also needed a place to house the batteries, inverter and other gadgets related to my power supply so they are protected from the weather.

Finally, I needed a base where I could work and store my tools and computer gear and somewhere to sleep while I prepared myself to build a larger dwelling. So I have ended up with the smallest abode that was practical, which in future will serve as my powerhouse.

The TARDIS is about 4 feet wide, 10 ft long and 2 ft high (including the wind generators). This might sound claustrophobic, but with the high roof, the doorway and two large windows looking out over the Border Ranges caldera, it feels quite pleasant. It really does appear to be larger on the inside than it looks on the outside!

The structure started out with six bush poles and a framework of 3 inch x 3 inch timbers into which a fence paling cladding and floor was nailed. The roof is galvanised iron and the windows are two large sheets of glass. Three of the poles protrude through the roof so that the bicycle wheel wind generators can be mounted on the top. I have now mounted a TV antenna and a CB antenna on it as well.

This minimum structure cost me about $150 and I think it's better value for money (and more weatherproof) than a tent.

I have since built a roof onto one side to give a dry space around the doorway and am now building a similar roof onto the other side. Both these extra bits of dry space will eventually be enclosed by walls and windows and then I'll start preparing myself to build my real house. In the meantime, I have somewhere to sit and type out articles in my little office.

Outside (at left) and inside (above) Peter van der Wyk's TARDIS on a bushy ridge at Blue Knob, near Nimbin, NSW.

Just 6 volts

6 volt battery power for home appliances

By Peter van der Wyk

In years gone by, the standard home lighting system in the bush was the 32 V system. In those days there were as many cars using 6 V battery systems as there were using 12 V.

Today, nearly all cars have 12 V battery systems while motor cycles run on either 6 V or 12 V. Trucks generally have 24 V systems.

While there has been a tendency towards higher voltages for motor vehicles, there has been a tendency towards lower voltages, mostly 12 V and 24 V, in battery powered home lighting systems.

I think the main reason for this swing to 12 V and 24 V is because there are so many appliances available these days that will either run off or adapt to these voltages. Because the family car is equipped with a 12 V system, this voltage has become the most popular. There are portable Hi-fi systems, belt-driven turntables, portable colour TV sets, portable compressor motor refrigerators, electric drills, soldering irons — and much more — readily available, relatively cheap and designed to be powered by a 12 V battery system.

Unwittingly, I have found myself accumulating 6 V equipment. First, it was the NEC/PC-8201A lap computer and data cassette (**Peter's Portable** in Earth Garden 44). Then I got a Brother EP-44 printer and a Brother HR-5 printer to connect to the computer, both of which run on 6 V. I also started using 6 V Krypton filled light bulbs in preference to the 12 V vacuum bulbs that I had been using previously (**Super Krypron lamps** in EG 46).

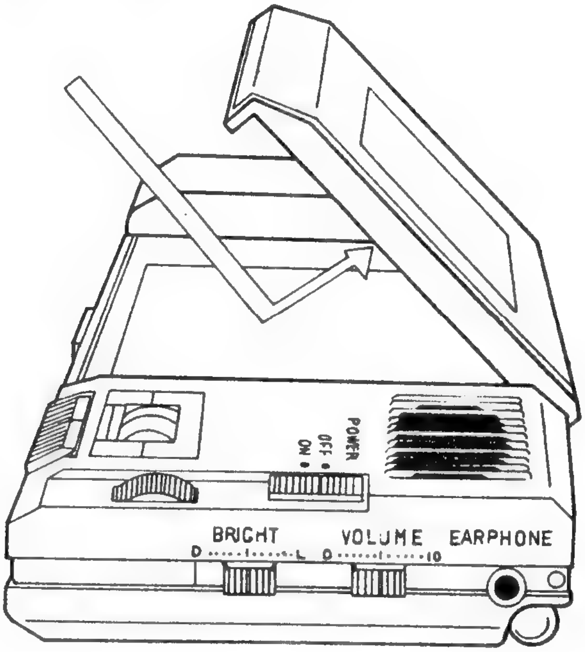
6 V POCKET TV!

I have now acquired a 6 V sound system (AM/FM stereo and cassette player) and a 6 V TV set. You would most likely be familiar with most of this gear, but did you just read *6 V TV set?*

The computer on which I write my articles has a liquid crystal screen and uses only 0.065 amps at 6 V (0.39 watts). My neighbour has a Microbee computer and uses a 12 V black and white TV for a screen and this system uses 2 amps at 12 V (24 W). So, as a comparison, my computer uses only one 60th of the power of my neighbour's and has the same storage capacity (32 kilobytes).

The point that I am intending to make here is that, rather than having to increase the power supply in order to run more apliances, it may be more cost effective to deliberately choose appliances that have a very low power consumption. There may not be many examples that would give such an enormous energy saving as the computer comparison. Using bicycle Krypton bulbs instead of vacuum bulbs is only about three times more efficient (although it may be up to 20 times more efficient than its 240 V equivalent).

My latest high tech example of efficiency is my 6 V pocket TV. The TV is only small, the entire set fits in my shirt pocket. It uses about the same amount of power as my computer (0.965 amps), which means that I can run it from a 100 amp hour battery continuously (24 hours a day) for more than 1500 hours (more than two months) without charging the battery.



It is a digital TV set with a black and white liquid crystal display (LCD) screen which requires external light in order to see it. You can either view it under available light, or clip on an electro-fluorescent panel to light up the screen. This panel uses an extra 0.04 amps at 3 V.

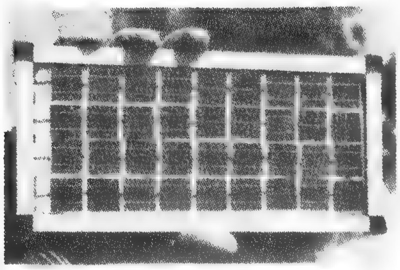
In Japan they are now manufacturing larger digital TV sets with colour LCD screens. In a couple of years time you will be able to buy a colour LCD screen that hangs on the wall like a picture frame and can plug into a TV receiver not much larger than the dial you use to tune it. The same screen may be connected to a computer or a video recorder and would have very small power requirement.

Chargers for different voltages

The lower the voltage of an energy system, the cheaper the initial outlay needed for the system may be. For a 24 V system, you can connect two 12 V photovoltaic solar panels in series charging two 12 V batteries in series.

Although 12 v solar panels are more common, you can get 6 V solar panels as well. Solarex market a 21 W (2.75 amp) 6 V panel for $290.00 (refer to catalogue no LW100GT). Kyocera (distributed by Amtex Electronics) have a large solar panel rated at 40 W (5.40 amps) at 6 V (cat no PSA100HH-182) and a similar panel rated at 20 W (2.70 amps) at 6 V (cat no PSA5OH-182).

My **bicycle wheel wind generators** (EG39 and **Energy Works!**) will charge both 6 V and 12 V. The advantage of connecting them to a 6 V battery bank is that they will be charging more often, because they don't need to be spinning as fast to produce 6 V. The propeller type bicycle wheel wind generator is easier to build and is a better charging system than the **Savonius rotor** type (EG41 and **Energy Works!**).



Solarex W4D 6V solar panel.

If you already have a 12 V system, you could use it to charge a 6 V system with a 6 V light globe. You connect the negative of the 12 V battery directly to the negative of the 6 V battery. You then connect a light globe and light switch between the positive of the 12 V battery and the positive of the 6 V battery. The larger the light globe, the faster the charge. I have used my 6 V Krypton lights in this way, which means that whenever I turn on a light, I am providing an amp charge to the 6 V battery.

If you do go for a dual power system like the one just described, it also pays to have three distribution cables and three neutral links around the house; one for positive 12 V, one for positive 6 V and one common negative. All 12 V appliances connect between positive 6 V and negative and 6 V incandescent (not fluorescent) lights between positive 12 V and positive 6 V to act as the 6 V charging system.

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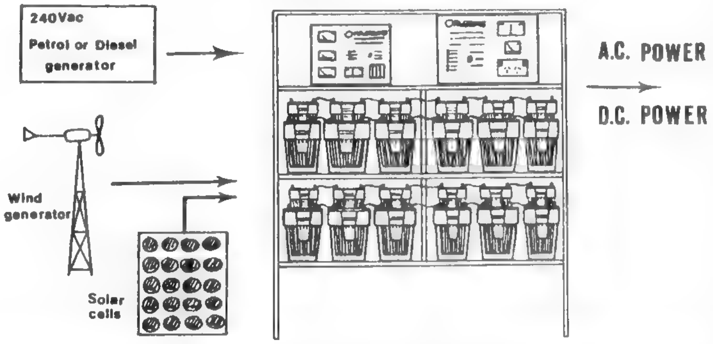

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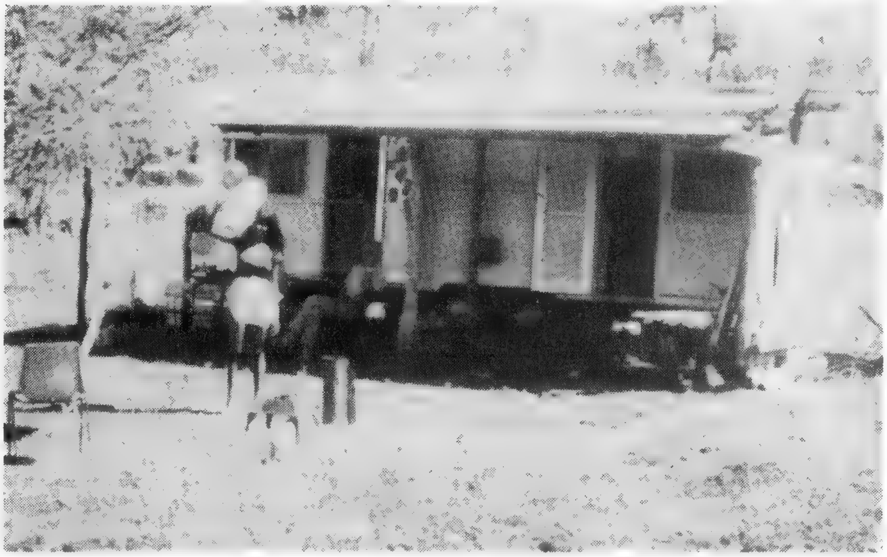

A big block of land, a caravan and one solar electric panel is the basis for a life of genteel frugality and eco-living for Patrick and Munni Howden on Macleay Island, Queensland.

Holey Ground, Macleay Island, Qld

By Dr Patrick f. Howden

It's been a big search to find that special near-Utopia island, a hunt that has included 72 countries, many of them with extremist or corrupt governments. What a surprise to find the simple life Utopia right back at my home country. As an inventor, what a chance to research alternative technology (AT) and set up an edible jungle, especially of tree plants.

Having just married Munni, a gorgeous Indian girl, in Fiji and still selling my books, **Eco-logistics** and **We can survive** in Britian and NSW for some years, we figured on finding a homeland + workshop. I'd seen Nimbin 12 years back, so we tried such multiple occupancies, but had we a chance of being loved by 20 critical folk for six months before acceptance? Besides, we always feel frustrated more than one block from the sea.

That's when a lovely TAFE College librarian mentioned cheap land on the pretty Bay Islands, only 35 km from Brisbane's culture, data and products and only a short drive to the Gold Coast. We arrived at Redland Bay ferry with our big old caravan and life's possessions in tow, regretting we hadn't got all the back issues of Earth Garden to advise on priorities.

We called this huge block Holey Ground because of the huge number of holes we had to dig: for loo, well, pool, compost, trees and plants, groundsel weeds, deep freeze (holey cooler), carport and letterbox! Of course, the most important land selection criteria are water (ours is a clear swamp pool), wood (a rainforest backs the quarter acre) and good soil. Well, it's marvellous, with rain most evident in the sea-moderated temperatures and wonderful sharing folk.

There are few if any bugs or nasty animals to bother the plants, which is just as well since we figure that the top priority job on any new ground is to start an edible jungle, especially the long-delay food trees, even before home building or energy systems.

Earlier, the 8W lamp and TV ran off the van battery as our perennial border garden was assembled and trenched from vast amounts of wild growing or contributed cuttings. Border food trees not only save land space by using the neighbour's nutrients for half the plants, but eventually aid privacy. Many wild foods abound, including herbs, bananas, fruit, fish (caught from sailboat), oysters and crabs, to save trips to the local shop or $2 ferry rides to 'Australia'. Apart from extensive bartering, there's a real thrill when plants emerge and luckily Stradbroke Island isolates these 365 islands from withering storm spray.

Other contributions to self-sufficiency come from a carefully sorted dump, our bikes, low rates, masses of unregistered bangers for $50 and the delightful absence of bureaucrats. Turning this primitive frontier into a 'genteel frugality' without joining the Scroungers & Bludgers Anonymous has been fairly effortless and cheap. I call it Home Engineering.

One solar panel energy. For the sake of one dole cheque or the cost of connecting mains power you can purchase a small solar system to provide 20 years of free power. First off, we purchased a 42W Solarex panel and stuck in on the water tank, connected an old 12V truck battery via heavy leads and ran a short cable to a junk-fused switch panel. Then we went shopping for 12V appliances, which proved vastly cheaper at marine or auto parts houses than the equivalent mains-operated units! Included were TV/radio/cassette combo of 10W (less than a car dome light), two 8W fluoro lights, submersible pump (4 amps), truckie fan that has three speeds by adding two switched resistors, drill, shaver, vacuum cleaner (needs a bit of kneeling), soldering iron (30W) and a mozzie zapper (3W) to clear the critters after 5 pm closing.

Later plans include a solar-charged electric trike. Apart from Kalgoorlie safes, we still haven't solved the fridge problem. What's needed is a 1 amp Esky-style machine, but still no luck. Any ideas anyone, as we wish to place these gadgets on display some time so that other folk can short-circuit lengthy decision-making?

All that sounds like a lot of power and it is, except for one clever gimmick. I use a clip lead to tap down a series jug element to save power. Even the TV and lamps can run on about half power! Soon a variable duty ratio chopper will save even more power on these items and on our indispensable pocket computer (Sharp PC1500) and Brother HR5 printer. Well, how else could we set up an AT/Tech Math Design Library (we do this on WordPro), or figure out companion planting schedules, inter and succession cropping, soil pH, watering times, crop quantity and rotation and a database for permaculture?

Other Home Engineered needs are satisfied by a 5 gallon black bag Sola shower hoisted up a tree, a manual laundry (boo hoo); my Vortex stick stove invention (featured back in EG10) and a handy forked tree that solves a stick-breaking problem; table grease bands for ants; mudbricks; human-powered treadle sewing machine; generator torch; thermos for tea all day and water bottle to warm winter beds; non-electric music; heliostat or CB radio to save phone bills; conical solar cooker; shoe soles made of truck tyres; non-cut, non-stitch sarongs; scythe lawnmower; plank-brick furniture. Natural fertilisers consist of seaweed, leafmould, and burnt oyster shells for lime. We jump into the swamp, the sea or a wet T-shirt in order to cool off on the occasional scorcher.

Sadly, nearly all this optimum hardware is made in Taiwan, China, Hong Kong, etc. What a sad reflection on our much needed manufacturing initiative! What a job creating opportunity! We would like to fill these gaps with ideas from like-minded inventors, so do please write, soon. By the time you get around to visiting this magical island, we may have completed a cheap kit home, cheap because there are no interior walls (apart from loo for Council approval) or other fancy options. I have oft been quoted about $8,000 for such basic housing.

We believe life here has to be relaxed, civilised, peaceful, often slothful, though above all, FUN. We especially pray that all you alternative folk can rush here to settle before the insensitives arrive. Come and visit, soon.

Patrick f. Howden, Backyard Tech Enterprises, Con Street, Macleay Island, Queensland, 4165.

ECO-LOGISTICS

The second edition of Patrick Howden's **Eco-Logistics**, a funky, illustrated large format 112 page wide-ranging cornucopia of alternative technology, inventions and clever ideas, is available for $10.00 including postage. **We can survive,** a handbook of planning for disaster and emergency survival (flood, fire, war, nuclear, biological or chemical), also full of useful ideas for frugal living, is $2.00 including postage.

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ATHERTON Tablelands. I am looking for an old fashioned ice cream churn to buy. I also want to know where to buy fresh bean curd (not tofu) in the Cairns — Atherton area, and the nearest food co-op and good health food shop with ground flour, beans and nuts in bulk, etc.

Peace & love, Ann Jensen, PO Box 434, Malanda, Qld. 4885.

CHLORELLA CULTURE

Overall view of the algae production area. To prevent temperatures rising too high, nets on the ponds shade the surface of the water. In the background, at right, a dryer for rice and algae is being constructed.

By Rene Schneeberger

After my first article in this magazine (**The algae pond** in Earth Garden 46), I received more letters than I could possibly answer. All those Earth Garden readers who have not received a reply yet I beg to be patient, the answer will come. But, since it isn't possible to answer the same questions hundreds of times, I decided to write another article to explain how chlorella (an edible species of micro-algae) has to be grown.

First I must clear up some misunderstandings. *I have never said that chlorella alone can be used for animal feeds.* In any case, chlorella has to be mixed with some roughage, for which we use rice bran or corn bran.

Practically all the nutrients an animal needs *can* come from chlorella, but not the bulk to fill its stomach, which is important, especially for ruminants. If they were fed with chlorella alone, there would be practically no roughage for them to ruminate.

Right now we are feeding pigs, chickens, turkeys, goats and other animals (such as dogs) with a mixture of rice bran and chlorella and they are all doing very well. We have a poultry operation for 30,000 head under construction and there we shall use 40% commercial feeds, 35% rice bran and 25% chlorella. This combination will give us about 23.6% of protein in our feeds. The chlorella will not be dried first, it will be directly mixed wet with the rice bran and the commercial feeds. We are still using commercial feeds because it is more economical under the conditions here. Still our feeding expenses are reduced by about 50% and the quality of the animals we produce is very good.

Under different conditions another combination might be more appropriate. The chickens we are producing are broilers and the average weight on slaughter day is 1.2 kg after a feeding period of between 36 to 42 days. We are using the same mash through the whole feeding period. The size of the algae ponds needed for that poultry is roughly 2000 square metres and is divided into five ponds and a harvesting pond.

Chlorella starter

Now let us come to the question I found in practically each one of your letters. *Where do we get the starter?* It is a question I have had to ask myself many times before. The answer is simple — grow it. Chlorella can be found in practically every patch of stagnating water all over the world, even inside the Arctic Circle. Of course there are different strains, but practically all of them can be used.

Basically it can be said that the chlorella strains growing in the area where you live are the right ones to cultivate in a pond. The fact that there might be some kinds of algae in the same pond is basically right also, but not important. Most of the time chlorella lives in a symbiosis with *Scenedesmus, Spirulina, Spirogyra* and some other kinds of algae. There is even some *zooplankton*, like *Euglena Gracilis* and *Euglena acus* or *Chlamydomonas globosa.* Of these symbionts of chlorella, none is dangerous to animals.

If is different in the case where chlorella is produced for human consumption. Then the strain must be kept pure, something that is very difficult to do. After 25 years of experience I still have a hard time keeping a pure strain really pure. There are ways to purify the water one gets from a green pond. Zooplankton is much bigger than chlorella, so it can be filtered out of the water simply by using an aquarium and an aquarium filter. This is how I also have to grow my starter. I always keep a couple of aquariums with ready starter at hand. From time to time new starter has to be put into the ponds, as algae can also be overaged.

Obtaining the starter is a problem that seems to bother many readers and I have even been asked to send the starter to Australia. This would be a possibility if there are enough people interested in getting the starter directly from me, otherwise the expense for the freight would be too high.

The second best possibility would be if an Australian biologist were to grow the starter in large quantities and sell it to the farmers who are interested.

The next option after that is for the farmers to grow the starter on their own farm, from algae they collect from nearby stagnating waters or fish ponds. Of course, this is not as simple as it sounds. The first time you do it, you might even fail, but on the other hand it is not so complicated that it can't be done.

Some knowledge of water management is needed, For instance, you should know what the pH or the water is and how it can be changed. The pH is the acidity of the water, which can be varied by adding either alkaline or acidic chemicals. For instance chlorella grow best in a pH between 6 to 7.5 The pH can be increased by adding digested manure, because this manure usually has as acidity of 8.5 to 9.5 pH.

To reduce the pH you can use pure rainwater, which is always pH neutral. There are also chemicals that can be used for this purpose. A pharmicist can advise you on this. As I have mentioned before, chlorella live always in a symbiosis with other micro-plants and zooplankton. To get the chlorella culture as pure as possible, vary the pH as often as possible. Each species of these microbes have a different pH which they prefer and they will die if the range varies too rapidly for them.

Another method is to use a centrifuge and different kinds of filter paper to separate the different sizes of the micro-elements. That all sounds much more scientific than it actually is. It is not very difficult to do and we have farmers doing it who cannot even spell their names.

Algae pond with side walls reinforced by 'stack-sacks' — rice bags filled with clay reinforced with bamboo — to make the wall solid and watertight. Each pond has a surface area of 300 square metres.

Fertilising the algae

Another problem I encountered in many letters was the question of digesting the fertiliser that has to be put into the ponds. There must have been some misinterpretation of what I meant. The chicken manure is dissolved in about six times the amount of water (1 kg chicken manure in 6 litre of water). After that some milk, powdered, fresh, evaporated or even skimmed can be added. All kinds of milk contain *lactobacillii* and this lactic acid will pre-digest the manure. The whole thing has to stand for about three or four days before it can be used in a 'digester'.

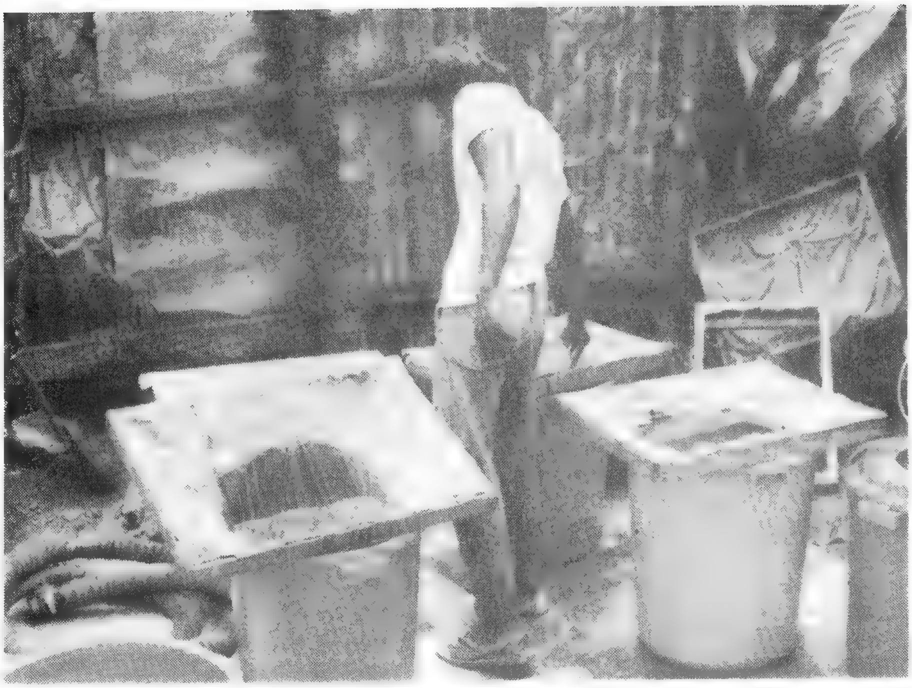
Practically any utensil may be used as a digester as long as it can be more or less sealed against fresh air coming in. It can be a plastic bucket, a steel barrel or a concrete tank. The amount of milk I use is about 0.05% of the volume of the manure I want to digest. The process of digesting is *anaerobic,* that means without oxygen, so therefore the containers must be closed as airtight as possible. It should be left undistrubed for at least one week before using. The better the manure is dissolved and digested, the better the algae will grow.

Here I should warn readers that the *algae grown on manure should not be used for human consumption.* If algae is grown for that purpose, another kind of chemical fertiliser has to be applied. The formula for this fertiliser is difficult to obtain, because growing algae for human consumption is a very good business.

Algae ponds

I mentioned already in my first article that I do not advise people who do not have the necessary knowledge to grow chlorella in ponds that are bigger than 5m × 4m (20 square metres). The water management becomes too difficult to handle. There is nothing against building more than one pond of that size. The amount of fertiliser that has to be put into the newly-filled pond is usually 3% of the actual water volume of the pond. That means that if a pond has a volume of more than 3,000 litres, the amount of fertiliser is 90 litres of predigested chicken manure. This, again, is just a general rule. If the pH has to be increased, then you might need more than this.

In our system, which has proved to be most effective, we have divided our ponds into four different compartments and in a four-day cycle we harvest one pond after the other. Of course this system may be applied to four different ponds of 20 square metres each, but then you will also need a harvesting pond because you would need to use the *chemical harvesting method,* a point we shall come to later.



The most primitive method of harvesting algae. A wood frame and a piece of cheesecloth is enough to get the chlorella out of the water. This is usually done with a centrifuge.

The ponds I usually construct do not have a flat bottom, but have one corner that is twice as deep as the other three corners. The purpose of this is that algae will naturally flow where the water is deeper, which makes it easier to harvest them.

Under no circumstances should the ponds be deeper than 25cm. My ponds have a water level of 15cm on average. The reason for this is simple. Like all micro-algae, chlorella reproduce by photosynthesis and they need a lot of sunlight for that purpose. If the water level is deeper than that, not enough sunlight can penetrate to the bottom of the ponds and the algae there will weaken and die. Of course, during the hottest season of the year, the water level sometimes has to be increased, otherwise the water temperature will climb too high and the algae will die.

The temperature of the water should never be hotter than 45°C, or there won't be any more algae to harvest.

Chlorella can be very moody creatures. Sometimes they just refuse to grow normally. If this is the case they lack something that they need. That something could be fertiliser, it might be that the pH has changed for some reason such as heavy rainfall, or (in most cases) the chlorella don't have enough CO_2 to breathe.

Don't forget that algae are plants and they convert CO_2 into oxygen. Chlorella has even been used as a gas exchanger in submarines. They convert the CO_2 that human beings exhale into oxygen. In such a case, I use an old engine, producing as much CO_2 as possible, and blow the exhaust from the engine into the water. Never mind about the lead, or whatever else you consider to be dangerous in the exhaust, the algae will take up only the pure CO_2 and nothing else. This method is very effective and cheap and cannot affect the algae as feed. In some cases this method has been used for the production of chlorella for human consumption.

Harvesting and drying

There are several different chemicals that can be used for harvesting. The best one I know is alum powder (aluminium sulphate). After a lot of experience, I have come to the conclusion that nothing else should be used. Alum is absolutely harmless to animals and it can be applied safely.

The amount of alum I put into the water is 0.05% of the total water volume. That means that for 1,000 litres of water I use 500 gm of alum powder, distributed equally all over the water surface. Within a few minutes the chlorella will coagulate and sink to the bottom of the pond. After that has happened, the water is pumped out of the pond and the algae can be scraped from the bottom.

We found that fresh algae is more digestible for livestock than dried algae. Under the climatic conditions here in the Philippines we can feed fresh algae almost all the year round and we have to dry a reserve stock only for the rainy season when sunlight is scarce.

There are different ways of drying algae. We produce our reserve stock always during the high production season when we have plenty of sunlight, so it is simple to sun dry them. Before putting algae in the sunlight, you have to get as much water out as possible, otherwise the algae cake will rot in a short time in humid conditions.

We use cheesecloth on simple frames to sieve out the water. The cloth is fine enough to let the water pass through, but it keeps back the chlorella. It should not take longer than three to four hours to dry the algae cake. You can build a dryer, but the heat should not be more than 45°C, otherwise the protein will be destroyed.

Feeding and nutrition

Now we come to the nutrient content of chlorella. I mentioned that we have 55.6% crude protein in this kind of algae. This is right as you will see in the chemical analysis table printed here. This figure is an average, sometimes the content we have is even highter.

But let there be no misunderstanding. Wild growing chlorella do not have this protein content, the average there is only about 4% to 5%. Wild growing chlorella hardly ever have any fertiliser to enable them to produce

Washing algae ponds after harvesting.

more protein and they are hardly ever supplied with CO_2 for better growth.

Chicken manure alone cannot produce that amount of protein content, because it usually contains only about 14% of crude protein. To increase the protein content of algae, other ingredients have to be added as well in the digester. For 1,000 litres of digested manure, I use 1 kg of urea and about 2 gallons (about 9 litres) or cattle blood.

To increase the vitamin content which is low in wild growing algae, I put in 2 kg of pure bee honey and a couple of other things which are a 'trade secret' which belongs to our company. With the ingredients I have mentioned, the protein content will be about 50% and the vitamin content will be reasonably high.

Chickens. For chickens, we usually give 1 oz of wet chlorella per head per day, mixed with pure rice bran. If you can understand the analysis shown in the table you will see that all minerals, amino acids and other requirements of the chicken are met in this formula. The protein content we have with this formula is about 22.5%, which is more than enough for broilers. Commercial feeds have 21% in starter mash and less in all other mashes. We feed the same mash from the first to the last day. Usualy we butcher our chickens after 38 days with an average weight of about 1.1kg.

Pigs. With our pigs the results are even better. We wean our piglets after a sucking period of five weeks. The average here in the country is eight weeks. The weanlings are normally in very good condition, though in the first few days they lose some weight as there is no more 'double feeding' from the milk of the mother as well as normal feed. However, we have observed that after a few days they adapt to the

THE VALUE OF CHLORELLA

Reading the information in the tables attached will say more than many words about the value of chlorella.

Chlorella, an edible nutritious algae plant, is capable of continuous mass-production in marine and inland waters. It supports all sea-life and is the most protein-rich food ever discovered.

The following comparisons are made between US Department of Agriculture Handbook No 8 figures. Analysis of the chlorella powder is done by the Laboratory of Nutritional Chemistry, University of Tokyo. Chlorella contains 18 other amino acids and many other vitamins.

Table 1. COMPARISONS.

Vitamin	Chlorella Dry Powder	Cheese, richest Cheddar	Top Grade Cows Milk	Sirloin Steak	Brown Rice	Soy Bean Flour	Lettuce
	100 grams	100 grams	100 grams	100 grams	100 grams	110 grams	100 grams
A	100,330 IU	700 IU	160 IU	20 IU	0	121 IU	1900 IU
C	59.6 mg	0	0.6 mg	0	0	0	18. mg
Niacin	240.0 mg	0.1 mg	0.08 mg	2.9 mg	4.2 mg	2.3 mg	0.3 mg
Calcium,	2940.0 mg	860. mg	114. mg	17. mg	39. mg	218. mg	35.mg
Phosphorus	2900.0 mg	780. mg	93. mg	100. mg	304. mg	613. mg	26. mg
Iron	570.0 mg	0.6 mg	0.04 mg	3.7 mg	2. mg	8.8 mg	2. mg
Carbohydrate	15. gr	1. gr	4.8 gr	0	75. gr	33. gr	2. gr
Protein	55.6 gr	14. gr	3.2 gr	24. gr	7. gr	39. gr	1. gr
Fats	13.3 gr	19. gr	4.0 gr	10. gr	3. gr	22. gr	0

Table 2. NUTRIENT COMPOSITION OF FREEZE-DRIED ALGAE

Nutrient	Average % (g/100 g)
Protein	55.6
Crude fat	13.3
Carbohydrate	15.0
Ash	8.4
Moisture	3.0
Crude fibre	4.7
(Chlorophyll	4.2)
	Milligrams % (mg/100 g)
Calcium	2950.
Phosphorus	2900.
Iron	570.
Carotene	60.2 (100,333 IU)
Ascorbic acid	59.6
Thiamine	2.40
Riboflavin	5.83
Niacin	24.1
Vitamin B6	35.6
Pantothenic acid	4.62
Folic acid	73.0
Biotin	0.185
Vitamin B12	0.102
Vitamin E	1.83

Amino Acid = 100g protein	g/16g N = 100 g protein
Histidine	2.21
Isoleucine	4.74
Leucine	10.23
Lysine	8.12
Methionine	1.27
Cystine	0.97
Phenylalanine	5.55
Threonine	4.60
Valine	7.82
Tryptophan	1.10
Aspartic acid	10.15
Serine	4.37
Glutamic acid	11.48
Proline	4.62
Glycine	6.08
Alanine	9.44
Tyrosine	3.04
Arginine	5.38

This is one of the native pigs. They are usually small and not heavier than 60kg. This sow has never eaten anything but rice bran and chlorella. Her weight today is 105 kg.

new conditions and from then on continue to gain weight.

The feed conversion is very good: 1.31kg/kg. With commercial feeds we have a feed conversion of only 2.41kg/kg. For piglets we use a 33% mixture of rice bran and chlorella which will bring about 23% crude protein. That is more than the requirements. Once the pig is a grower of about 20kg, we reduce the protein content to about 19%, simply by adding more rice bran to the same feed as before. Pigs and chickens are usually not fed *ad lib,* we give controlled rations.

Fish. This was another question I met again and again in letters from readers: can chlorella be used for fish and prawns? The answer is yes. Under conditions here, Tilapia is one of the most produced fish and results are very good. The same goes for milkfish. Chlorella mixed with the usual feed for shrimp will greatly reduce their consumption and at the same time growth will increase and mortality will decline rapidly. At the moment we are not producing feed for fish or shrimp because we are still building up our recycling programme.

When using commercial feeds it will help a great deal if chickens or pigs are allowed to drink the chlorella water directly from the pond. Usually most animals will take it without any problems and after a while they even prefer the chlorella water to normal drinking water.

As incredible as it sounds, chlorella feeds can cure fowl pox without any medicine. Fowl pox is very common in the country areas of the Philippines, but in our poultry it is not difficult to keep under control.

If you prefer to mix the chlorella with whatever roughage you have available, then my advice is to pre-digest the feed again before feeding it to the animals. This is done in the same way as pre-digesting the chicken manure. The taste of the feeds will be slightly sour then and all animals seem to like that taste very much. Digestibility is also increased by almost 20%, which is another advantage.

The disadvantage is that predigested feeds have to be used as soon as possible. As long as they are in airtight plastic pails or bags they can be kept for weeks or even months, but once the bags are opened, they have to be used in the shortest possible time. Under no circumstances should they be kept longer than one week. Fungi will develop and then the feeds will rot in a very short time. We do not apply any chemicals against fungi here, but it can be done.

References. Many readers have asked me to send them the titles of books and literature about growing chlorella and Spirulina, but this is not as easy as it may seem. There are books on the market, like *Spirulina,* by Larry Switzer, published by Bantam Books, but the book has no details explaining how Spirulina is grown. This is understandable because Larry Switzer owns a large Spirulina plant in the United States and, or course, he is not willing to help his competitors.

Thee are some books in German, such as *Chlorella als Tierfutter,* by Hans Brandt, but this book is difficult to find as it is published by the Akademie Verlag in Leipzig, East Germany. I have never seen an English version of that book and I don't think that there is one. My own thesis is about chlorella as an animal feed, but this is also written in German. I have not translated in into English yet and fear that I won't have time to do so in the future.

Biogas digesters

In your letters I usually also find another question about the biogas (methane) digesters we build here. Some readers seem to have tried producing biogas with negative results. Well, our results have all been positive. I can imagine that the chief reason why many digesters do not produce gas is simply that they leak and gas is escaping through the walls.

It is simple enough to make a biogas digester watertight, but to make it gas-tight at the same time is something quite different. Gas molecules are much smaller than water molecules and that makes things much more complicated. Concrete digesters especially have to be sealed very well, adding 'Sahara cement' to make it watertight is not enough.

Jimmy, the Taiwanese engineer, tests the centrifuge he built from scrap iron.

Another problem with biogas digesters is that the gas production is greatly reduced if the inside temperature of the digester is not right. The best temperature lies between 31.6° and 35.6°C when the anaerobic fermentation is very high. The gas production also depends on the quality of the manure and other wastes that are fermented.

At the start of digestion, the ratio of manure to water ought to be 4:1. Once the gas is producing normally, the ratio can be decreased to 6:1. It may take a shorter or longer time before biogas is being produced, depending on the inside temperature of the digester. Usually it takes about three weeks, but I have seen cases where it took more than six weeks.

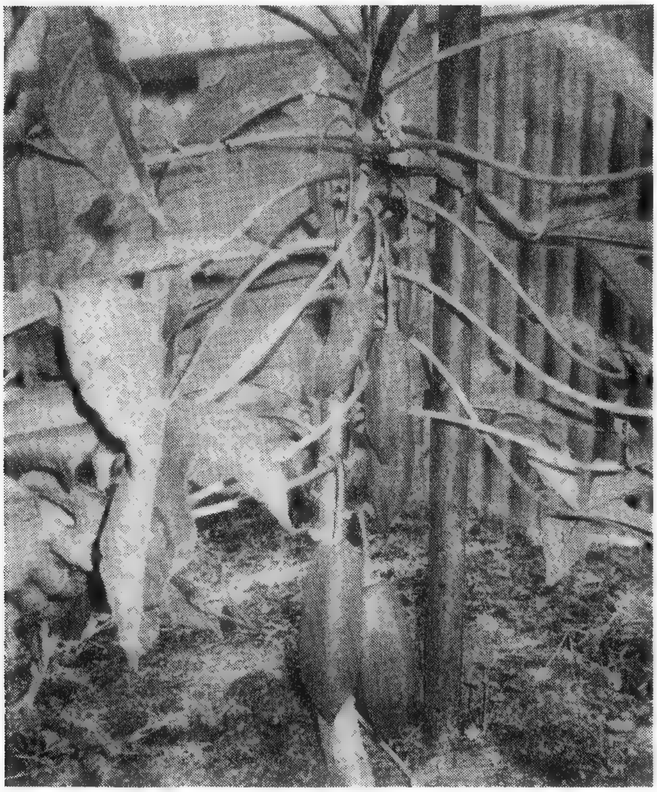
There are many other questions in my readers' letters. Those who do not find the answer to their questions in this article have either already received a direct answer from me, or they will receive one in the near future. I do apologise to everyone who had to wait, but I could not forsee that my article would have such a feedback. There are many other things I could suggest to Australian farmers in rural areas, but if I go into these problems now the article would be too long.

I have had some invitations to come to Australia to introduce our kind of technology. I would like to thank everyone who invited me, but I firmly believe that I cannot accept these offers. No one person alone could shoulder the expenses that would arise, my fees are high and expenses would not be cheap. If there is a group of interested people who are willing to share these expenses, things would look different. Under these circumstances I might be able to accept an offer.

If there are other questions, please do not hesitate to write to me. I really shall do my best to answer each of your letters. But please do be patient, don't expect me to answer within a week or two. I also have a job to do and to neglect my work just to answer letters is something I just can't do.

My address is: Dr Rene Schneeberger, YKS Compound House 3, Anibong District, Tacloban City, Philippines.

Growing babaco



BABACO *(Carica pentagonia)*
By Rose-Marie Loro

What is babaco? It is a tropical fruit with a subtle flavour said to be a mixture of pawpaw, pineapple and a hint of strawberry.

Although it is originally from the highlands of Ecuador in South America, it is at present grown in New Zealand and is doing very well.

The babaco is a hybird between the Chamburo and the mountain pawpaw. It is similar to pawpaw and the fruit is bright yellow when ripe. The fruit can grow up to 2kg each in weight and can be kept up to four weeks when picked. Babaco is less cold tolerant than pawpaw.

Fruit is produced on long stalks from the trunk. Fruit will form at almost all leaf bases and new fruit forms on new growth of the tree trunks. You can expect to be picking fruit about 10-12 months after planting. When the fruit has reached full size it should be left on the tree for about two months more, during which time it changes colour from deep green to bright yellow, and is then ready to pick.

The babaco plants pictured were ordered through the Department of Agriculture in our home state of South Australia in mid 1984 at a cost of $48.00 for *each* plant. The plants, delivered in containers, were about 9 months old and approx 23cm high.

Planting took place in September of the same year, after sorting out which position would give us the best results. We selected a spot which would give the plants the best possible protection against strong winds and which had sandy soil with good drainage.

However, the babaco can be left to grow in the container, if need be. This makes it a lot easier to care for and to regulate its drainage requirements. It also allows you to move the plant around to protect it from winds and gain the maximum amount of sunlight.

If planted out in spring, it isn't long before the babaco begins to thrive and produce flowers. The first fruits from our plants were ready to eat in November, 1985. The fruit takes quite some time to mature, but it was well worth the wait as we had to pay up to $6.00 per fruit at our local greengrocer. So, even at the price we paid for each plant, the babaco pays for itself in the very first season.

The plants are thriving here in Adelaide. The CSIRO has indicated that babaco has great potential in Australia, though as it is a new plant they advise that upon purchase you should find out as much as possible about them and what problems there may be in growing babaco in different areas.

Don't ever be put off trying something new and different, as we have by well-meaning nurserymen who tell us not to waste our money, time and effort on something that won't grow in Adelaide. Nothing is more rewarding than trying something new, watching how your work and care produces results such as a new fruit crop with a new taste sensation.

Cultivation. When choosing a site for planting, remember that the babaco loves full sunlight and needs protection from winds. Because the tree has a shallow root system, when it is fully laden with mature fruit it could be blown over by a strong wind and it's a lot better to be safe than sorry. The babaco should also have protection from frost damage. Because it grows to between 2-3 metres high, protection from frost is *not* difficult. A protective square plastic framework can be made up to go around the tree. If you make it 30 cm higher than the height of the tree, all you need to do is add a top cover to the framework when frost threatens.

Make sure your plant is in well drained soil with plenty of organic matter added to it. We are told the plant has a reasonably high phosphate requirement. Aged fowl manure works well and according to results so far seems to be the ideal fertiliser for babaco. It was suggested also that a couple of handfulls of blood and bone should be sprinkled into the hole and blended with the soil before planting. Trace elements of boron and zinc are recommended for good results, although we did not add these.

Watering requirements are similar to those for pawpaws. To eliminate the risk of fungal infections, *don't* water from overhead, but rather use a trickle watering system. The importance of good drainage to the babaco's health can't be stressed too strongly.

Deep cultivation of the plant is *not* recommended because the babaco has many surface feeding roots. To keep the weeds at bay mulch is a must and works wonders protecting the delicate feeding roots from drying out. A suggestion for a good mulch is to mix dried lawn clippings, aged chicken manure, sawdust and woodchips.

Known pests of babaco are the broad mite and the strawberry mite. We are told that the two-spotted mite, known as *Tetranchyus Urticae,* found on most fruit, is the only major problem. A miticide Dicofol Kelthane is recommended for this. Spray *very carefully* on the underside of the babaco leaves and around the fruit clusters. Thrip has also been seen to cause slight skin damage.

The babaco initially grows a single fruit-bearing stem which should be pruned back to approx 15cm after the fruit has been harvested. Three shoots usually grow from the stump. It was suggested to us that we should remove all but one shoot, but you can leave several trunks if you like. This disperses the vigour of the plant and the result will be smaller fruit. To establish new fruits, use the pruned shoots as cutting material.

Eating. The fruit of the babaco can be eaten skin and all, or simply the flesh alone. Babaco is a good source of vitamin C. The fruit can be eaten raw, juiced, stewed, bottled naturally, or even baked. The fruit cooks well and stays firm, similar in texture to a cooked pear. Babaco can also be frozen.

My favourite way of eating this new exotic fruit is in a mouth-watering fruit salad.

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HAY MAKING

By Sophie Masson

Haymaking is an old, old art, almost as old as the hills. It has been documented from Biblical times and beyond.

The implements associated with haymaking go back a long way too. Humanity has tried to make this backbreaking work easier with tools ranging from wickedly gleaming scythes and hay rakes to the 'new-fangled' machines pulled by draught horses, bristling with implements like tedders, swathe turners and mowers.

Then came the roaring mechanical tractors and, for smallholdings, machines like the *Allen* scythe. Today, of course, haymaking has gone 'high tech' like everything else and bales no longer need to be square to fit into sheds. They can be made as enormous round bales which are left in the field and used as needed as the sheer volume of them protects the hay from the weather.

For humble earth gardeners, the old ways are still the best. If you are lucky enough to find a suitable horse and all the associated equipment shown in the picture, well and good. But for many of us who cannot afford either draught horses or tractors,no matter how battered, some instruction in the gentle art of haymaking by hand or mechanical scythe is useful.

While visiting the southern African country of Zimbabwe last year we saw groups of men mowing and haymaking with seemingly casual, rythmical movements even on white-owned (and by definition, richer) farms. This labour-intensive practice survives there because tractors and other farm machinery must be imported and are correspondingly expensive and scarce.

I was soon to learn at first hand this exceedingly difficult task.

In the old days all over the world an experienced scyther could mow about 1½ acres a day, depending on how thick the grass was. It was estimated that about five haymakers were needed for every person mowing the grass. After the grass was cut, it was left lying in the field in swaths (the

Shire horses used for harvesting hay at Acton Scott Working Farm Museum in Shropshire, England.

rows where it fell), so that it dried evenly.

This part of the work is the haymaking and originally it was done by hand using hay rakes and hay forks. The old saying *make hay while the sun shines* was very sensible, for too much rain will soak into the hay and wash out a lot of its goodness. The grass is mostly cut in early summer as the best hay is made from grass which is just beginning to form seeds.

You can make hay from just about any grass; but the better the quality of that grass, the better the quality of the feed you will get. This might mean sowing down some grass especially. Lucerne for example, makes a very nutritious hay.

In the hot English summer of 1984, my partner David and I made hay on the four acre smallholding where we were living. It was very hard work. David used an enormous, grunting *Allan* scythe (made in the 1930s by the Oxford firm of Allan and still available in some places), which looks just like a giant rotary cultivator. Because the grass was very long and wild, the machine kept clogging up and stopping in the middle of the field (curses!). I had to go along behind with the hay rake, sweeping each swath away from the next row.

The first field we cut was not very good because a lot of rubbish, such as thistles, was growing in it and the result, was prickly hay. The second field was much better, with good, even lengths of juicy grass, which looked so luscious I felt like eating it!

Traditionally after cutting, the grass was turned over every day and so we did *ad nauseam,* keeping a suspicious eye meanwhile on the unusually clement English weather. Once the hay was made, and it was quite dry and golden, hay rakes and hay forks were used to rake the hay into windrows and then pile it into haycocks (mounds of hay) which could be lifted onto a wagon or put on a haystack in the field.

This is where we ran into trouble. We had no wagon, nor anything remotely resembling one, except for the 'jumping jellybean', our little red Citroen *Dyane 6.* Our first 'Professor Brainstorm' solution to the problem was to stuff as much hay as possible into an enormous black plastic bag and drag the resulting deadweight to the shed. Soon, however, our plucky little *Dyane* was transformed into a hay wagon, as the plastic was so ridiculously heavy.

It was still hot and heavy work chucking the hay into the shed and I had to climb on the whole prickly mess several times to make sure it packed down.

In the old days, hay was stored in stacks or lofts. Haystacks were usually rectangular in shape and the hay was piled up on a base of stones, wood or straw to keep it off the damp ground. When the haystack was complete it was allowed to settle and, if necessary, was topped up, then trimmed and covered. Nowadays, heavyweight plastic or tarpaulin is used instead of the thatch of wheat or rye straw which used to cover the stacks.

Once it is in the stack or hayloft, hay may sweat and get hot, especially if it is too damp when it is put in store. Often though, if you have made a good, dry hay, its temperature is even and it can be used, for example, in making yoghurt . . . bury the pot of yoghurt deep in the hay and it will do the work of a yoghurt-maker for you!

Many farmers in Britain today make silage instead of hay, for then the cut grass simply has to be put into an airtight pit or container without being dried. This practice is slowly gaining ground in Australia, even though it is estimated that silage making was known in the 16th century.

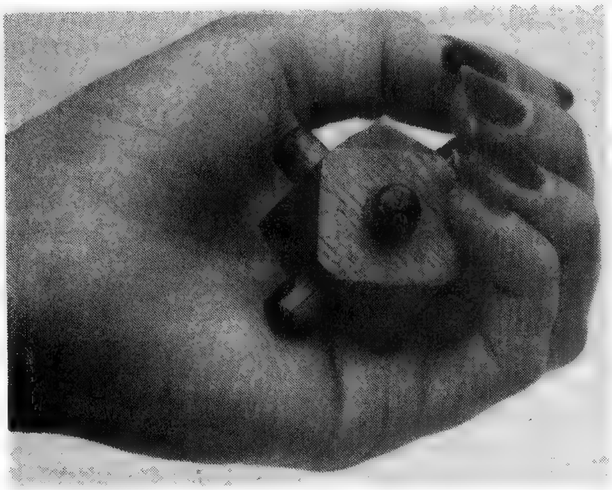
PS The goat and sheep loved the hay — prickles and all!

ORGANIC 86

"It's only natural" will be the theme of this year's annual festival of the Organic Farming and Gardening Society of Tasmania and Peter Russell-Clarke will be there to say it in person. There will be speakers on herb growing, medicinal herbs and bio-dynamic and organic farming, displays on growing fruit, vegetables, grains and earthworms, wholesome food on sale and a display of water turbines.

☐ Organic '86, March 1, 2, 3 at Penguin, north west Tasmania. Admission $5.00 per person per day, $10.00 per weekend, children under 16 free. Campsites $10.00 per weekend. No dogs allowed on grounds. Enquiries to Neil Jordan, PO Box 56, Zeehan, Tasmania 7469.

access



HANDMINE

"For years Greeks have handled worry-beads as a form of pacifier to overcome tension and athletes have been squeezing rubber balls to develop strength in their arms for about the same time," says Medley Clark, sales director of the Natural Force Company.

By combining the two, the company has come up with a new Australian invention which strengthens the muscles of hard working or injured hands and arms, gives relief from tension and pain and is also a tactile occupational 'toy'.

It's a small wooden sphere with 14 flat surfaces studded with six little knobs and is called the Handmine because it resembles a wartime naval mine. Rolled in the palm and fingers of your hands, the Handmine massages and stimulates reflex points and relieves stress or pain caused by arthritis or repetitive strain injury. There have been good reports of relief from tension by smokers and nailbiters trying to give up their bad habits.

☐ Handmine massager, from The Natural Force Company, comes with an instruction sheet and reflexology chart. Price around $6.96 at health food shops and pharmacies.

Building blues

By Jacqueline French

*** *Real names are decidedly not used in this article.*

Annie and Craig had lived together for 10 years. They met in their final year at art school, spent six years working and saving, dreaming and looking for their block of land and three years building their home, a modern version of a selector's cottage, stone and adzed slabs and carved windows looking out to a newly planted orchard and old-fashioned perennial borders.

The perennial borders are still maintained, but Annie is losing heart. The marriage broke up three months after they moved into their house and she's been alone there for nearly a year. She's thinking of moving on.

It seems a common scenario.

At the end of three years' building Annie and Craig were broke. Their house may have been built (though not fully completed, like many occupied owner built homes), but they had spent their savings and three years slaving at the mortar had left them little time to pursue their careers.

It was the same with their social life — three years of intense self-involvement as their house progressed, at the expense of meeting new people and reaffirming ties with old friends, and just keeping up the support groups everyone under strain needs — and all this in a new area, to make matters worse.

They were left with the house, the realisation of their dreams and each other. It wasn't enough.

I'm not denying the fulfillment of owner building. We did it and I'd do it again and speak of the joys of owner building at the drop of a hammer. I wish I'd known more about the strains and stresses before we went into it, full of idealism, some of which if forewarned we may have been able to avoid.

We live in an area of New Settlers, have friends in other New Settler areas and even a lot of our urban friends are the build-your-own sort. Okay, marriages break up for many reasons, but so often lately from friends and acquaintances and two social workers to whom I've spoken, owner building has been, if not the final straw, at least a few mudbricks towards the break-up.

It's strain enough for two peole to live together in an ordered, routine, well-serviced life. It's even more of a strain if they need to work together, especially in the social semi-isolation that often comes with owner building, often with financial pressure, and the growing need to finish the building, for your own sense of achievement, outside pressure, or just the need for a roof over your head. It's a rock-steady relationship that isn't touched by it.

We lived and sometimes worked together for about six years before we started to build our own house. We seemed to have our roles worked out — shared housework, shared income producing, shared ideals, designing our own home together — all the norms of our peers.

It didn't prepare me for the strain of suddenly becoming a builder's labourer, instead of his partner. Like most women I'd never done carpentry at school, or pottered with stone walls and I couldn't replace a spark plug in the cement mixer. Either I had to learn fast or resign myself to being a helper. The time and financial and personal pressures of owner building often don't make for the best time to learn carpentry and stone masonry. We both grudged the time it would take me to learn and the possible waste of precious materials.

As it turned out, I learned both stone masonry and how to accept the role of helper, to some degree at least (I'm still a lousy carpenter), as well as learning to take the initiative in other areas that neither of us knew much about. But I'm still nowhere as competent a handyperson as my partner and it was hard to get used to this change in role.

Then there's the corollary: the person who isn't raising up the roof beam or juggling the plumbing is the logical person to make the lunch. Sure, it was logical, but still a shock, to find the traditional male-female roles creeping up on us.

The whole matter worsened with the birth of our first child. Heaven help anyone who has to cope with a young child on a building site. The core of our house was livable, but nowhere near finished (the whole house is still far from being complete). There was the added strain that there was nowhere safe to put the baby, continually keeping an eye out for tools left near baby height, the sawdust in the pureed vegetables and the electric saw at nap time. Even worse was the knowledge of the house progressing while I couldn't be part of it, as well as the extra pressure on both of us (self-induced and perhaps instinctive) to make a house for the baby.

We survived, in our fashion, but I'd hate to go through that part of it again.

Roland and Michelle's marriage broke up a few weeks ago. Michelle left, taking year-old Brian with her. She'd never been as keen on owner building as her husband. She liked the idea of a house they'd designed and realised that the only way they could afford it was to do most of the work themselves. She had no real interest in the actual banging and clattering and putting things together.

For Michelle, the worst strain, two years after starting their house and now living in its unfinished shell, was the lack of the expected showpiece, or indeed any comfortable place to ask guests. The kitchen still wasn't set up to do the sort of cooking her ideas of entertaining demanded and clothes were still in boxes because the cupboards still weren't built. She'd had enough of mess and noise and nothing done quite in the professional manner and, again, the comparative lack of social life.

Added to this were the problems of coping with a baby in an unfinished house, with a husband who was often preoccupied with tiling the bathroom. I think too, that Michelle, like many people, couldn't visualise the final product. That's the foundation for many owner builders, the vision of what the house will eventually be, an idea which many people aren't capable of. I remember the shock when some city friends came out to see our half-completed house, a featureless stone shell in a dusty paddock, and didn't rave about its beauty. I realised that I'd been seeing it as it would look in six month's time, but couldn't expect them to do so.

It probably wasn't owner building that broke up Roland and Michelle's marriage, but it was certainly a deep cause of Michelle's unhappiness and perhaps a preoccupation that hindered both of them from solving their problems till it was too late.

Owner building stress seems to strike at a variety of moments. I know one couple where one partner would

Building the good life . . .

By Jacqueline French

What do you get when you buy a farm that's mostly granite rocks and blackberries?

Forgetting about the blackberries for the moment (if only we could), you start moving rock from one part of the farm to another, by hand at first, then by wheelbarrow as you become more affluent (there's a great leap forward in technological ease when you learn how to use the wheel and the inclined plane), then by truck when repayments on the land aren't so crushing (thank heavens for inflation, too).

We built roads and ramps, a creek crossing and a couple of stone walls until in eventual progression we built our house. Given the sea of rocks around us I suppose it was inevitable that we built from stone. David also has an unswerving Tasmanian conviction that all true house are modified piles of rock. As we looked around the place before buying it, I could hear him muttering at each mullock heap, "Good building material here".

So we designed our house, measured out rooms in other people's houses (they got used to us pacing their living rooms and counting under our breaths), poked our heads up chimneys, worked out solar underfloor heating and a debris-free system for storing kitchen wood. After three years we had our ideal home design.

So much for the ideal. I won't go too deeply into details. Suffice to say that the concrete poured by the contractor (the only bit of work we weren't doing ourselves) had slightly less strength than wet sand. Three years and a 'successful' court case later (no one but the legal profession really wins such cases), I was pregnant and we'd moved into the converted machinery shed that is still our home now.

Actually, we're not too sorry about the result, though I don't suppose we'll ever build our ideal home now. The machinery shed conversion was planned for four stages:

Stage 1. Enclose the open roofed area in stone and fit it out as 'house like' as possible.

Stage 2. Add a bathroom at the rear.

Stage 3. Add two rooms (mostly glass) at either side of the bathroom.

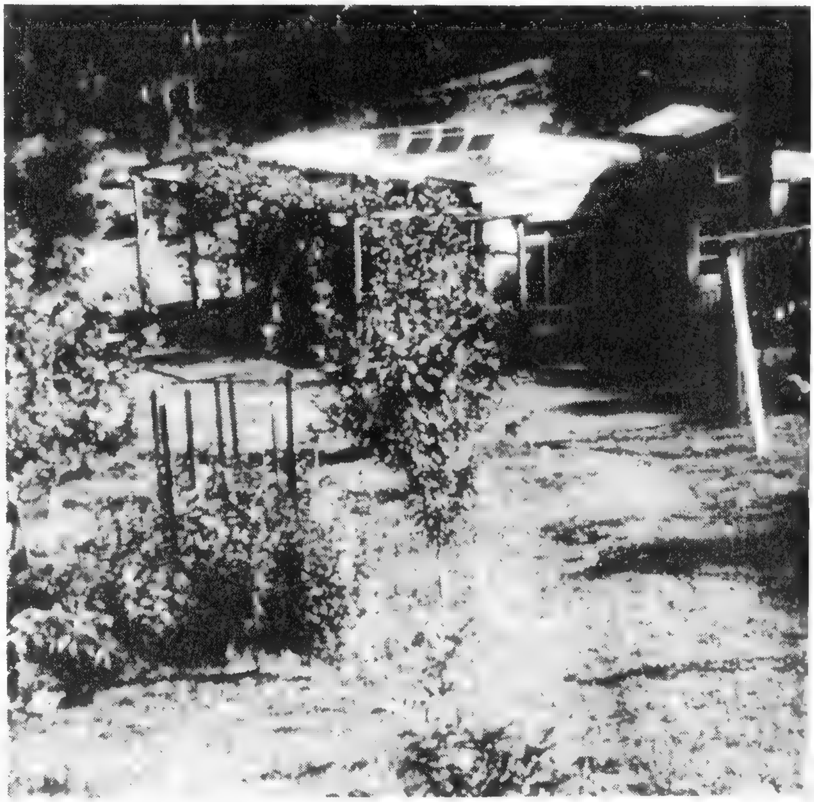
Stage 4. Add another wing at the side, effectively doubling the size of the house.

In true owner builder tradition, however, we've only got up to preparing for Stage 3 and while we've been declaring we'll start work next month for the past two years, there is an inevitable stream of projects that get in the way — jobs like a new paddock for the wethers and a revised water system for a dry patch — and by then, of course, it's apricot season, or the beans are ready and all hands are picking.

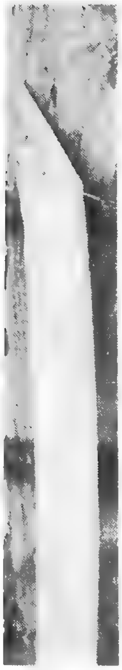
For ham hands like me who can't even draw an intelligible crooked line, stone building is probably the most creative practical work I'll ever do. Walls grow, solid and beautiful. You can kick them and punch them and lean your back against them and know that come flood, storm and locust plague, they'll stay solid.

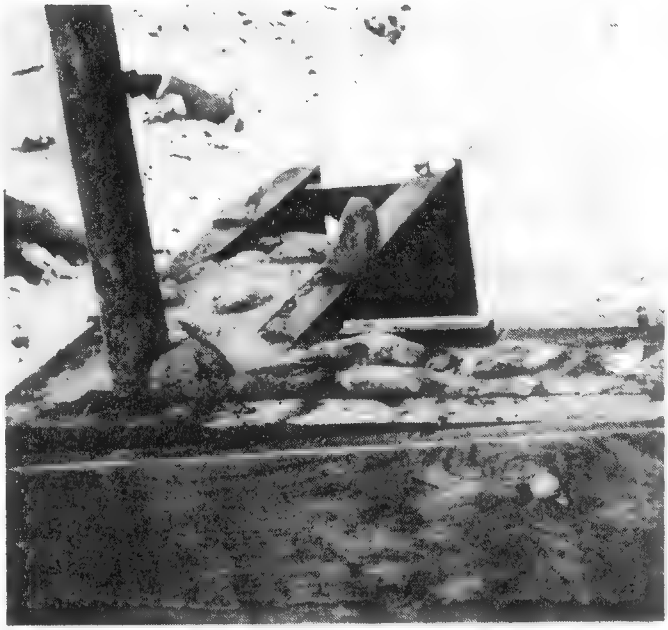
Stone walls are also cheap and surprisingly quick

Building our house. Libby and David at work with stonework forms (a
house two years after building (below). The pigeon house affair holds
electric system. Inside the house the day we moved in (top right) and
stone formwork with first course of stone (bottom right).



with 1,000 tonnes of granite





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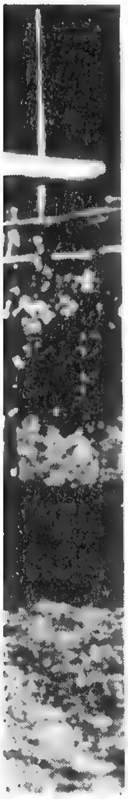


to build. The walls for the house cost $300, mostly for gravel and cement (we foraged the sand and rock). We built the shell of the house in three months, about 10 squares in the first part, with any number from one to four of us working, with farm work interrupting and no professional help (well, a few professionals did help us, the odd psychiatrist, zoologist, journalist and vet, not exactly working in their specialties).

We built with forms to begin with, on a concrete slab, using cheap seconds 3 ply, which was too light (we'd use 5 ply next time) and 5 cm x 10 cm (2 inch x 4 inch) hardwood, which was too heavy (we'd use 5 cm x 7.5 cm — 2 inch x 3 inch — softwood next time).

We'd line up the forms on top of the previous layer, which was still drying, wire them together and layer in rocks, carefully sliding flat faces outwards against the form, with as little space as possible mortared up between each rock filling up the 'back' with 'ugly' rocks and concrete (the more free 'uglies', the less expensive concrete needed). This meant one rock-faced wall outside and a smooth well-tamped concrete wall inside.

The first course looked horrible. We gazed in shock. We'd been so sure that our handiwork would be glorious. Hadn't we seen the pictures and read the books that proved that any amateur could build a stunning house of stone? But we got better and learnt to create symmetry out of irregular shaped stones, to tie walls together with long rocks over short ones and to balance large slabs with contrasts in size, form and colour.

Unless you are using round river rocks, which give a pebbled, freckled effect, by and large the bigger the slab of stonework the better it looks. Finished walls look better than their beginnings because the sheer size and overwhelming 'rockiness' balances out the imperfections.

Most of the work involved in building your own house is in gathering the materials and finishing it, years of scavenging cheap doors and windows, 'end of line' tiles, second-hand timber and tonne after tonne of sand and rocks. Finishing the house is worse, weeks of fiddling with plumbing, climbing around ceilings with insulation, pounding putty into elderly windows or hanging doors which, second-hand and laboriously stripped of paint, never fit where they are supposed to without hours of adjustments.

But the memories are wonderful. From where I sit, I can see the corner rock that I had put aside, sure it was gold-bearing, which David appropriated when I wasn't looking for its perfect corner shape and had it mortared before I noticed, or the windowsill built with such hilarity as Libby read out the Women's Weekly 'Guide to Etiquette'!

When we look at the house now it's hard to accept that we built it, that it didn't accumulate itself from the scree slope behind the house or the pink and grey granite in the creek. It will be good to get building again. If only there was a building method incorporating blackberries!

never accept a house plan. Dozens were tentatively accepted and rejected. He had a dream of a palatial engineering triumph and enough commonsense to know there was no way they could build it. But to accept any plan would mean admitting the end of his dream. He drew house plans for four years. The marriage cracked, but not asunder, and a modest (interesting and attractive) house is nearly finished.

Another friend declared his worst moment was putting the paling fence around his newly finished house. He says he suddenly felt shut in, as though he were fencing out all his youth and freedom and the chance to roam the world outside, leaving himself with his wife and kids and flowerbeds and nappies, all enclosed inside the fence.

The parting note in a marriage of two other friends was over the amount of bourgeouis comforts they'd finish off their house with — curtains, light fittings, carpets, etc. Perhaps that was just a pretext, though, as the party most firmly against the consumerist trash is now settled happily with another partner, surrounded by deep white carpet, crystal ornaments and polished antiques.

There are so many things that can go wrong when you build your own house. There are things associated with building, like a sneering bank manager or an unco-operative Council, or other problems that may have happened anyway but are more disastrous when you're building, such as a lost job, illness, a slipped disc or family problems. When you build your own house you become vulnerable to many more strains than you find in routine life. You'll be working under pressure, even if it's self-imposed pressure, and the handiest person to snap out at will be your partner. I know of only a couple of owner building projects where everything has gone smoothly (and maybe I just don't know the half of it).

Friends, family and neighbours often don't help:

"When do you think you'll be finished?" (from everyone).

"Are you sure you wouldn't like a normal house dear?" (Great Aunt Harriett).

"How much would it cost to get a builder in to finish it off?" (dubious mother).

"Then you could find a proper house" (father on the advantages of living in the city).

"Isn't it finished yet — the Smith's prefab went up in four days" (Weeds Inspector).

"Why don't you put in a solarium/atrium/heated indoor swimming pool as a heat sink/hanging gardens/greenhouse/turrets/have a more adventurous design — say six interwoven circles with connecting water garden and stained glass bridges?" (numerous young acquaintances).

Maybe the worst are the people who enthuse madly, exclaim how clever you are, how they've always dreamed of doing just that, while looking at you just slightly askance, a bit like a zoo exhibit. You know they think you're crazy.

One social worker I spoke to a couple of weeks ago claimed the worst period for owner builder marriage break-up was about three months after completion of the house. He is continually visiting single parents and finds the same story repeated. There have been years of saving and slaving and making do, there often has been more social isolation than either party has been used to (and this seems as true of communes as elsewhere — unless the houses are group projects, it doesn't matter how far away the neighbours are if you feel you don't have time to down tools and talk). Most of all, there is the end of the dream. There it is in wood, stone, brick or pise. Was it all worth it and where to now? And you've been living in close and sometimes strained proximity to one person for so long. There is often a desperate need for fresh stimulation, outlook and adventures.

A few or us were discussing all this a couple of days ago, all of us owner builders who'd experienced at least a few of the things I've outlined.

We came up with a few (tentative warnings):

☐ Never combine building with childbirth if you can avoid it.

☐ Always ask for a little help from your friends (then they'll feel free to ask you).

☐ Stop and talk sometimes.

☐ Keep up your career and social life at the expense of a slower house.

☐ The less experienced partner should pick up a few skills before starting to build.

☐ Don't move into the house too soon. Finishing off is harder, not easier, if you're actually in the place.

☐ Keep up a strong peer group of owner builders who'll comfort you when kit home and professional brigade come and scoff.

☐ Have some roof-raising parties, for other reasons than the roof!

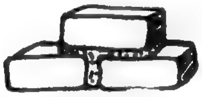
☐ Beware. It will all take six times as long as you expect.

☐ There will be long, horrible weeks when you seem to be fiddling with something forever with nothing actually achieved. Go and compare disaster stories with another builder.

I haven't meant this to put anyone off being an owner builder. But there seem to be so many raves nowadays, from politicians through to academics (none of whom have done it themselves), on the ease and joys and possible cheapness of the owner-built home that some comment seems to be needed on the other side of the balance.

I certainly never expected a lot of the strains of building our house and could have done with a few warnings. Then again, I could never have understood the joys either, the memories from every rock we laid (that's the stone that Libby gave me for a birthday present, that uneven bit we all trip over that Pip said we'd never notice, the rough bit we did with a party of friends so we could all go swimming, the bit of floor the 'concrete fairies' floated for us at midnight as a surprise, so many bits done by so many friends).

There's a lot more happiness than strain. If you can survive it, it's wonderful to look back on.



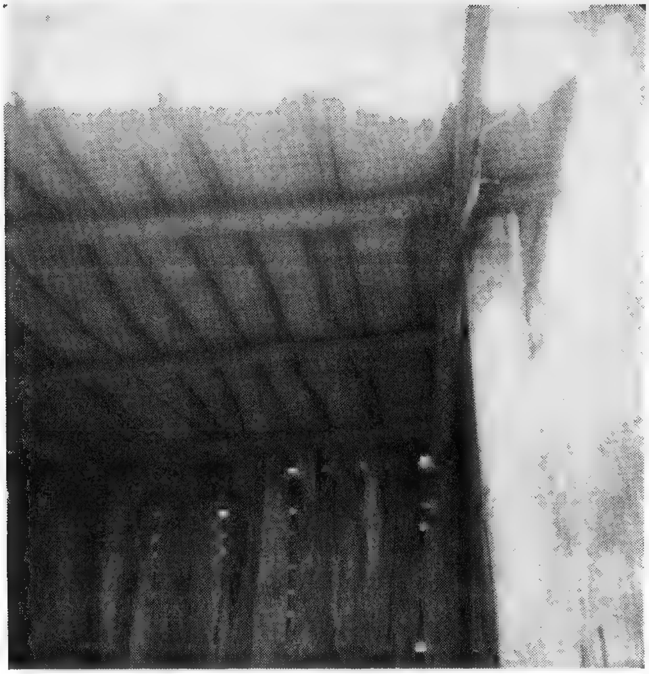
QUEENSLAND MUDDIES

The Exhibition of **Architecture in raw earth** in Brisbane was a great success, with more than 800 visitors on the first weekend, Chris Nash reports. An **Earth Builders' Society of Queensland** has been formed as a result.

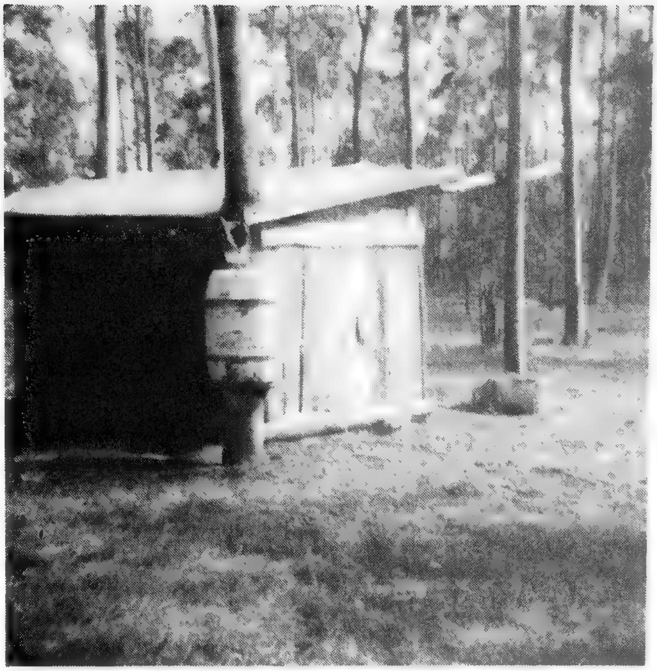
For further information, send an SAE to John Farnbach, Dundas, via Fernvale, Qld 4305, or phone (075) 86 7450.

Mudbrick Expo

The exhibition of earth building photographs from all around the world, with extra panels from Australia, especially Victoria and Queensland, will tour Queensland from April to November, 1986.



Underside of the chookhouse roof.



The chookhouse.

Ferrocement roofs

John Vukovich and his crew evolved this practical and cheap ferrocement roof building method by trial and error using a frame of palings or saplings, reinforced with wire mesh like birdwire and chicken wire (also plastic and hessian). The result is a roof shell which is stable, durable and waterproof when the cement plaster dries (if you don't use live trees for the supports).

The *ferro* here is the steel in the mesh and the *cement* is concrete without gravel.

FERROCEMENT ROOFS

By John Vukovich, Grafton, NSW.

Last year we were camped in our caravan in the uncomfortable atmosphere of a collapsing community but couldn't move onto the land we had recently purchased until we had done some initial development.

First a track had to be made to our chosen site. Second? During discussion about this there arose the question of the fate of our chooks and, somehow, building a chookhouse came to be the second priority.

This would be no big deal for most people. They would nail secondhand corrugated iron over a couple of poles and make walls from chicken wire and iron or fibro and that would be that; but I have a hangup concerning corrugated iron. This stems from my early childhood memories of living in an iron house: iron roof, walls, ceilings, lining, chimney, outside dunny and fences.

In that inland mining town most houses were similar. The extremes of temperature were transferred without hindrance to the interior, where a wood-fired cooking stove was a blessing in winter but made the kitchen hell in summer. So, I ruled out an iron roof — even for the chooks — and decided to try a sort of ferrocement roof.

We were impatient to move so the chookhouse was a rush job. We nailed and wired two poles, roughly parallel and at a slope to the ground, to four convenient trees, taking care not to kill the trees in the process. Across these poles were wired three more poles at about 4ft spacings. Across these three poles we nailed wattle saplings fairly haphazardly, but roughly about 9 inches apart. The aim was to form a deck which could be walked over gingerly.

Two inch chook wire was laid over the saplings and hessian tacked over that, followed by a layer of ½ inch birdwire, again tacked down. A plaster made from 3:1 sand/cement was mixed by shovel and spread about 3/8 th inch thick over the birdwire using a garden hand spade.

It is important that cement plaster and concrete be properly *cured,* which is usually done by keeping the setting mix damp for several days. Our only water supply was by buckets carried up from the creek, so the importance of proper curing became less urgent as our weariness increased. However, we managed to wet bags laid over the plaster a couple of times each day for three days. During that time we made a ferrocement spout to direct water from the lowest point of the roof into a 40 gallon plastic drum. Three walls were made from sleeper flitches (offcuts from railway sleepers) and bark, while the fourth wall (with a door) was formed from chook wire.

The day before we towed our caravan to its new site, we installed perches, nesting boxes, feed, water and the chooks in their new home. The chooks seemed satisfied, but by then the roof had cracked in several places. This was mainly due to difference in movement of the four supporting trees when the wind was blowing. The chooks learned not to perch under the roof leaks during rain and later the cracks were repaired by slapping dobs of plaster over them. The cracks and breaks in the plaster around the tree trunks were not repaired, so as to allow for some movement. The chooks approved.

Meanwhile the First Mate had let it be known that the novelty of laundering outdoors was wearing thin. Also, the whole crew thought a 'real' shower was needed. Obviously it was time to build another roof. When I agreed there were cheers, but when I suggested that here was a golden opportunity to show the merits of ferrocement roof *Mark 2,* the cheers faded, with sidelong looks at the chookhouse. Sure it was rough, but this one would be better. Financial factors won the day in favour of ferro!

This time we stuck six poles in the ground with three beam poles across them to form three portal frames with spans of about 11 ft at spaces of about 6 ft. The height of the portals was such that the roof would slope down to the south with a convex curve, so that rainwater would flow to the proposed ferrocement tank to be placed under the south portal. The curved roof would be a bit rumpled because the pole beams were not straight, but not to worry.

We had acquired a pile of secondhand 4 inch wide hardwood fence palings about 12ft long and calculated that we had enough to cover the roof area, including overhangs, if we spaced them with 4 inch gaps. On the ground palings were overlapped for 6 ft and nailed together and then placed across the portals and nailed to them, giving 3 ft overhangs over the north and south portals.

Other palings were then nailed across under the lapped palings at the ends and at the ends of the laps. Paling braces were nailed from the north portal posts to the north edge paling. The resulting deck was flimsy, but it could be walked on without collapsing, so it was deemed adequate.

Clear plastic sheet was tacked over the whole deck and that was covered with hessian, also tacked down. The plastic was laid in order to help slow down the drying of the plaster, but it incidentally made the unfinished roof watertight, so consequently the roof remained unplastered for some time while other work was in hand.

We laid the concrete floor, built a water heating brick barbeque, a 40 gallon drum was placed on the roof for hot water, a shower recess was put in and associated garden hose and polypipe plumbing was installed. Sleeper flitches were nailed in place to cut down the air-conditioning in the shower recess. The place was almost getting suburban.

Summer rolled on. We noticed rapid deterioration of the unfinished roof. The sun was turning the plastic opaque and brittle, but worse, sparks from the barbeque chimney were burning holes in the hessian and plastic. The resulting leaks dripped hardwood stains all over the place. The First Mate agreed that it was time to finish the roof.

A layer of ½ inch birdwire was tacked over the remains of the plastic and hessian. We shovel mixed 3:1 sand/cement plaster, but this time added about 10% of the cement volume of *fly ash.* This stuff is not the remains of cremated flies, but apparently comes from deposits in chimneys at some industrial factories. It is the modern equivalent of *pozzolan,* which was obtained from volcanoes and if the Romans used it, it's okay by me.

Fly ash makes the plaster 'fatty', as the plasterers say, which makes it easier to trowel and fill voids and is also reputed to increase the resistance of the plaster to water. I obtained my supply from a local concrete mixing plant with some difficulty, but I believe it can be obtained in bags in capital cities. There are probably other additives which will do the same job.

The plaster was trowelled over the birdwire to a thickness of about 3/8 th inch. Unfortunately the First Mate was using the washing machine at the time and some of the plaster dropped through one of the holes right into the washing. She showed admirable restraint.

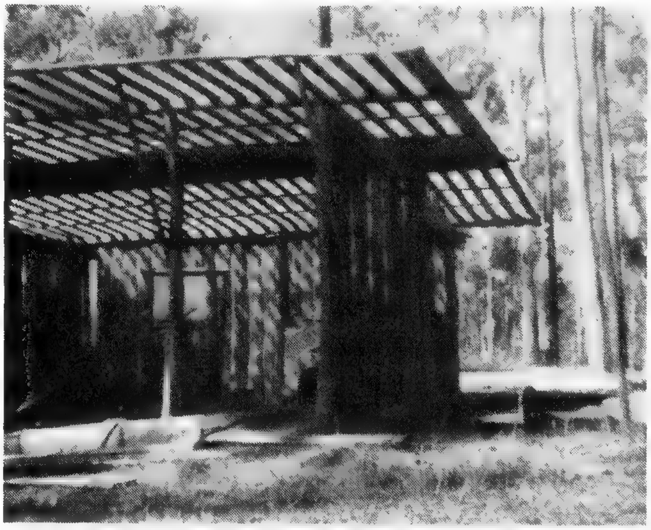
By this time we had a water supply pumped from the creek, so this roof had better curing than the chookhouse. When the plaster was fairly well cured, we painted it with *Silasec* slurry to seal it and fill the fine cracks which had appeared. There was one crack which persisted where there was a step in the roof at the lap point of the palings. I chiselled out the crack to ¼ inch wide and filled it with 2:1 sand/cement plaster and painted it with Silasec slurry. Since then the roof has remained waterproof.

While plastering, a ridge of plaster about ½ inch high was formed around the edge of the roof to keep rainwater on the roof. When the tank was built under the south portal, the roof was extended to cover it, leaving a square opening for the entry of rainwater and maintenance personnel. A square aluminium framed flywire panel was fitted into the opening to prevent entry of mosquitoes and leaves. Plaster ridges were formed on the roof to direct rainwater into the opening. Rainfall which could not be directed into the tank was caught by a ridge along the south edge of the roof and spouted into a 40 gallon plastic drum. Finally, plastic sheeting was tied around the tank and tacked to the palings of the roof to prevent frogs and mossies getting into our water supply.

By that time Evan was 15 years old, so he decided to leave his home (in the caravan annexe) and build his own hut about 30 yards away. The laundry wasn't too bad in his opinion, so he decided to build his hut along similar lines, but with improvements in the construction. We didn't have any secondhand palings left, so eventually we bought 80 new palings for $80.00.

Instead of lapping the palings over each other, Evan lapped them alongside each other, so avoiding the step in the roof. He nailed more cross-palings between the portals and had a stiffer deck. Before plastering he placed about 15 props under the cross-palings, so that when working on his roof there was much less movement to cause cracking. Best of all, instead of wasting time and energy shovel mixing the plaster, he flashed his disarming smile at a neighbour who promptly lent him a motorised cement mixer. Hessian was not used.

Two inch chook wire was laid across the palings and covered with clear sheet plastic, with the ½ inch birdwire over



Framework of Evans' hut before propping and plastering.

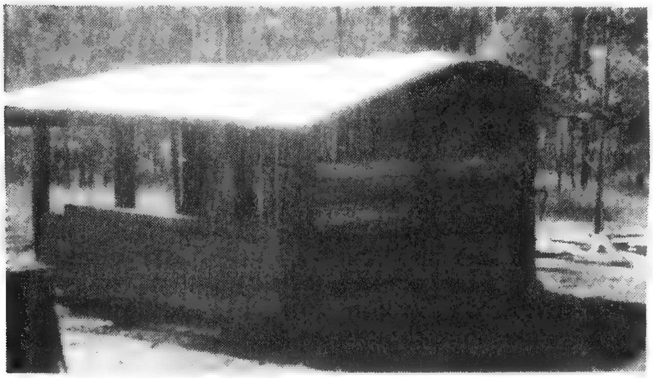
that. Evan used an extra layer of birdwire at the overhanging corners. There was no cracking around the overhangs, even though I thought he removed the props too soon.

Meanwhile, our livestock had been augmented with a very skinny goat and a tubby foal. The crew insisted that the poor little foal had to have a shelter and so should the goat, now that she was in kid. Further specifications insisted that the foal must have a fenced, partly cleared paddock and a shelter well away from the chooks. The skipper obeyed.

The solution to this housing crisis was agreed to be the building of a *gook house* (for goat and chooks) and the conversion of the original chookhouse into a horse shelter. Due to its gradual acceptance, ferrocement was the preferred roofing material.

There were two trees about 10 ft apart outside the proposed horse paddock. These were chosen as the posts for the ridge beam. The trees were felled, leaving stumps 8 ft above ground and a pole fixed over them. The sides were formed with posts and beams about 6 ft above ground and about 5 ft on either side of the ridge line, which was nearly on a north-south line.

Underside of the gook house roof during plastering.



The finished gook house roof.

For the south wall, logs were piled on top of each other and wired to the stump and post. For the west wall, using a borrowed *Cinva Ram,* a block wall was built using a 1:2:5 mixture of cement/sand/sawdust. The same mixture was used to fill the gaps between the logs in the south wall. The east wall and centre partition were made with vertical sleeper flitches. The north wall and doors were made from 2 inch chook wire.

With the strain of outlaying $80.00 for Evan's roof deck still fresh in our minds, it was decided that saplings would be used for the deck of the gook house, seeing we had a heap of them cleared from the horse paddock. The saplings were bent over the ridge beam and wired to the wall beams. Most of the saplings were not long enough to span right across so they were lapped from each side and wired together. Parallel to the beams, other saplings were wired to those bent over the ridge.

Eventually there were enough saplings wired up to satisfy the formula evolved for the roof deck, which runs: *"When you can gingerly walk over the deck using careful selection of foot placement and the deck does not collapse, it is strong enough if sufficient propping is installed before plastering."*

Two inch chook wire was tacked over the deck and covered with clear plastic sheet, ½ inch birdwire was fixed over that by wiring it though the plastic onto the chook wire. Plastering and curing was done as before.

Sonja, who has spent most of her life surrounded by the rough structures built by her old man, naturally tends to favour shop bought items. One day she came up to the gook house, critically looked it over and told me seriously *"Dad, I'd like to have a hut like that."* And so the ferro cement builder realised dizzily that he had obtained the utlimate acceptance of his work.

Comparison

The cost of corrugated iron roofing was quoted to me at $6.28 per square metre. To this must be added guttering, spouts, screws or nails, ridge capping and probably sawn timber.

I did some comparative costing on the materials in the gook house roof and worked out:

2 inch galvanised chook wire	70c/m²
½ inch galvanised birdwire	97c/m²
clear plastic sheet	35c/m²
cement	81c/m²
sand — free from creek	
Total	$2.83/m²

(plus tacks, nails and tie wire)

Our version of ferrocement roofing is obviously much cheaper than steel sheeting. It has another great advantage: no straight lines or angles are needed. This allows a versatility of design which can make a roof a pleasing sight rather than those visually polluting sharp boxes that are spreading across the country. We hope our next roof will show more of the potential of this material.

To those engineers who may shudder at our methods. We are experimenting with the minimum material requirements. We know that extra layers of birdwire vastly increase the strength of the shell and that firmer decking would eliminate cracking, though of course it would increase costs.

Ferrocement roofs are not new. Professor Pier Luigi Nervi designed some spectacular ferrocement stadiums for the Rome Olympic Games, as well as the first ferrocement yacht. The Cement and Concrete Association is a good source of information and references on the subject.

Anyone interested in viewing our efforts is welcome to call in if they first send a stamped SAE for directions to John Vukovich, PO Box 160, South Grafton, NSW, 2461.

Reference

Ferrocement, by Bill Chaitkin and Ferrostone Domes, by Peter Calthorpe, in *Domebook 2,* Pacific Domes, Bolinas, California, 1971, for a couple of pages on ferrocement dome building.

HOMEMADE LADDERS

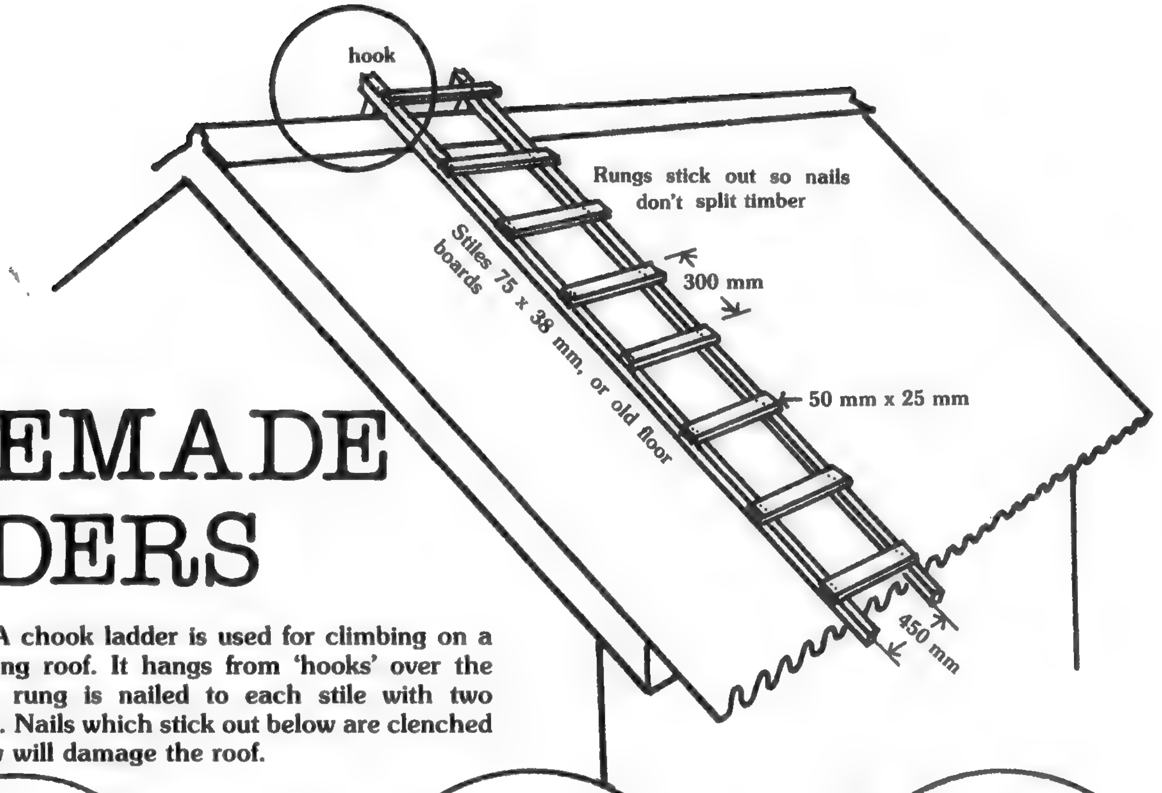

hook
Rungs stick out so nails don't split timber
Stiles 75 x 38 mm, or old floor boards
300 mm
50 mm x 25 mm
450 mm

Fig 1. A chook ladder is used for climbing on a steeply sloping roof. It hangs from 'hooks' over the ridge. Each rung is nailed to each stile with two 50 mm nails. Nails which stick out below are clenched over, or they will damage the roof.

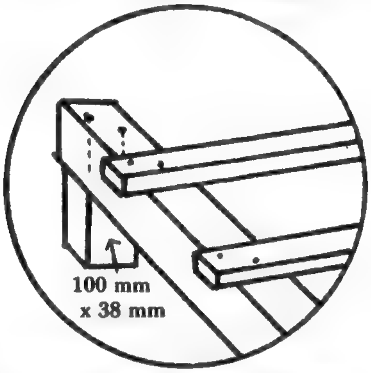


Fig 1a. Hook for floorboard stiles.

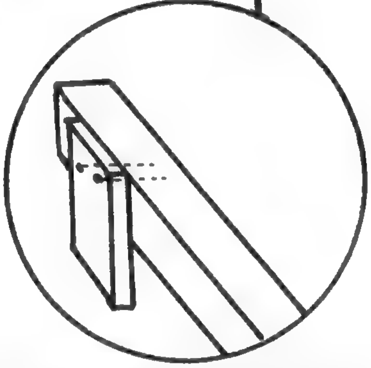


Fig 1b. A hook like this is adequate for most uses.

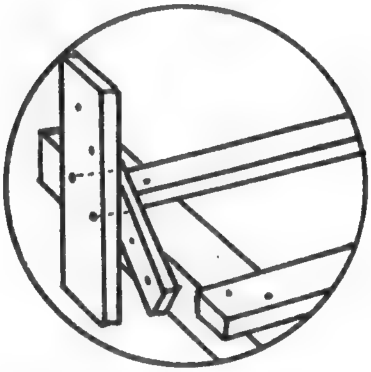


Fig 1c. Braced hook for heavy-duty use.

By Dr Robert Rich

It is possible to make a sort of ladder by nailing scrap bits of timber across two uprights at more or less regular intervals. Such a scrappy contraption is unsafe if leaned against a wall. It may slump sideways and weight is borne by a couple of nails which can bend in the wood. However, this method is good enough to build a 'chook ladder' used as a means for walking up a steep roof (**Fig 1**).

Roof thatchers used to have two very light chook ladders. The thatcher would hop from one to the other and lift the first one over his head. In this way he could move along the roof without having to perch on the ridge or climb off.

The chook ladder is held on the roof by a couple of short bits of wood which are hooked over the ridge. It can be light and roughly made, because it is supported by the roof for its full length, and the load on a rung is only a fraction of what it would be in the case of a normal ladder.

Fig 2 shows the minimum requirements for a safe temporary ladder. The rungs are seated on little notches in the stiles. To mark these (and the angle of cut for the foot of each stile) draw up a right-angled triangle in which one side is four times the length of the other. You can set a bevel (a tool like a square, but adjustable to any angle) to this, or cut out a triangle from a scrap of ply or stiff cardboard.

Rungs should be over-length to reduce the chances of splitting the wood when nailing. The projecting bits can be cut off later if they are in the way. Or nail holes may be pre-drilled. Use two 50 mm nails per joint. Here the nails don't bear any weight (the housing does), but merely stop the rung from coming away from the stile.

The diagonal brace at the back is essential for rigidity.

A permanent ladder is simple to construct if you take care with the joints. As indicated in **Fig 3**, steps are held in grooves cut in the stiles. These should fit tightly and be exactly in the right position. To achieve this:

☐ Select two straight, faultless lengths of timber for the stiles. Decide on the inside face for each (the face in which the grooves will be cut).

☐ Clamp the two lengths of timber together, with the inside faces touching.

☐ Make marks on the edge intended to be the front. Use a sharp, pointed object rather than a pencil. First mark

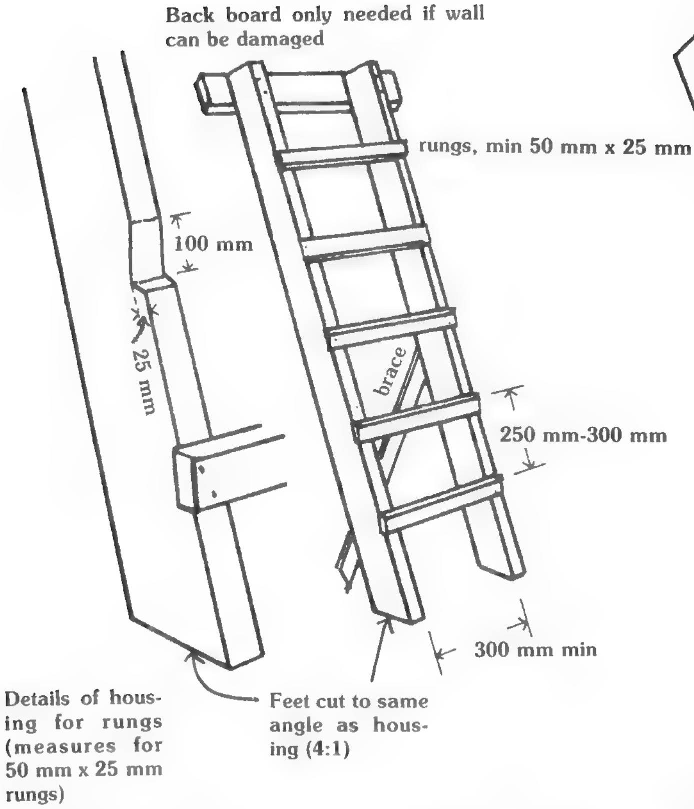

Back board only needed if wall can be damaged
rungs, min 50 mm x 25 mm
100 mm
25 mm
brace
250 mm-300 mm
300 mm min
Details of housing for rungs (measures for 50 mm x 25 mm rungs)
Feet cut to same angle as housing (4:1)

Fig 2. Safe temporary ladder. Minimum requirement for a temporary ladder.

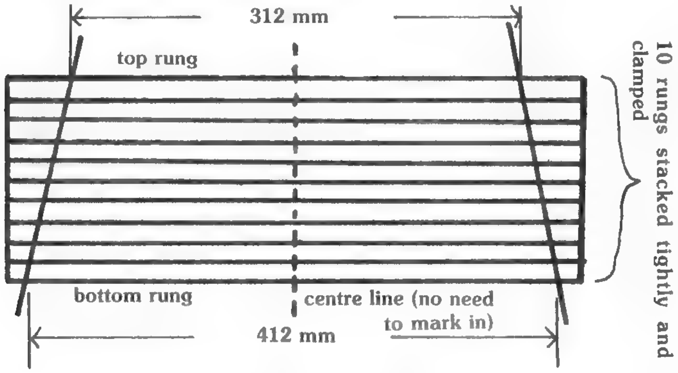

312 mm
top rung
10 rungs stacked tightly and clamped
bottom rung
centre line (no need to mark in)
412 mm

Fig 4. Marking out length of rungs for tapering a ladder. The method works for any length difference and any number of rungs, as long as the stiles are straight and rung spacing is even.

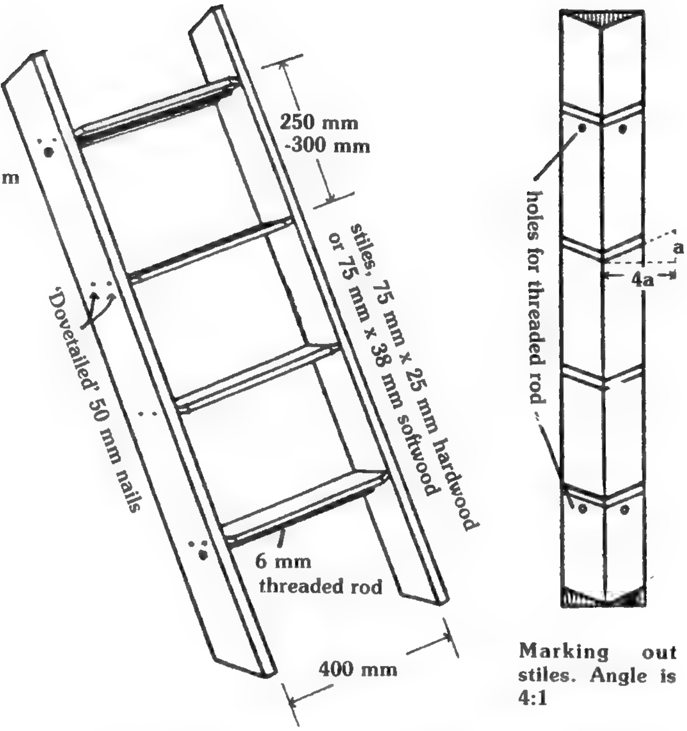
a square line across both stiles to show the foot of the ladder. Measure from this line to the top of each step and draw a square line across both stiles to each point.

☐ Unclamp the stiles and use a bevel or plywood template to mark in the top line of each groove.

☐ Next cut the steps to length and number them.

☐ Use each step to mark in the bottom line of the corresponding groove on each stile. This way you can get a tight fit, even if the steps vary in thickness.

The threaded rods shown in the illustration are only necessary if the ladder is to be moved around a lot, because the joints provide a surprising amount of rigidity.



Marking out stiles. Angle is 4:1

Fig 3. Permanent ladder. Stiles 75 mm x 25 mm hardwood or 75 mm x 38 mm softwood. Steps can be old 100 mm x 20 mm (4 x ¾ inch) hardwood floorboards. Joints should be 6 mm deep in hardwood or 10 mm deep in softwood. They should provide a tight fit. Nails should be angled in ('dovetailed'). Nails hold in end grain better than screws. Threaded rods with washer and nut at each end are only necessary if the ladder will get rough use.

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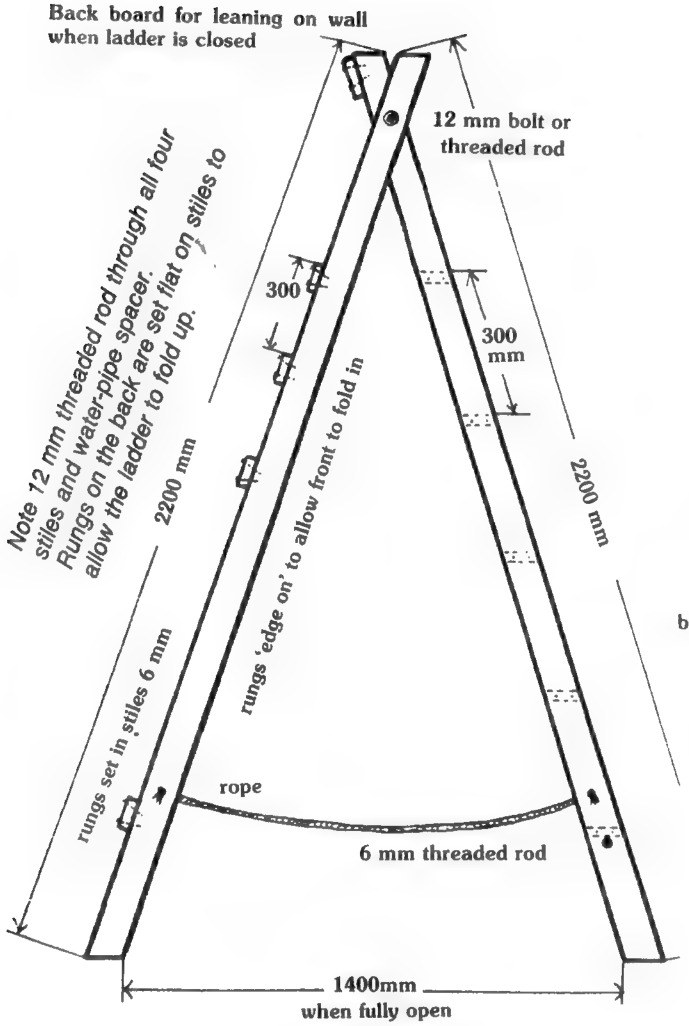

Back board for leaning on wall when ladder is closed
12 mm bolt or threaded rod
Note 12 mm threaded rod through all four stiles and water-pipe spacer. Rungs on the back are set flat on stiles to allow the ladder to fold up.
300
300 mm
2200 mm
rungs 'edge on' to allow front to fold in
2200 mm
rungs set in stiles 6 mm
rope
6 mm threaded rod
1400mm when fully open

Fig. 5a. Side view. My homemade step ladder was designed to be straddled under a 3 metre high ceiling and for a thousand other uses. It is robust, though heavy. All timber is secondhand 75mm x 25mm (3″ x 1″) hardwood.

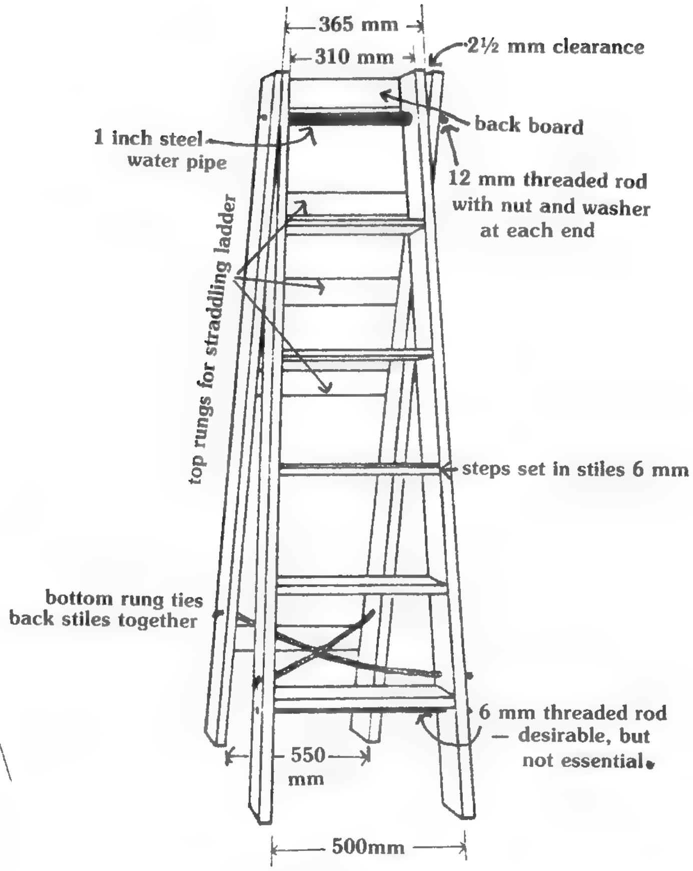
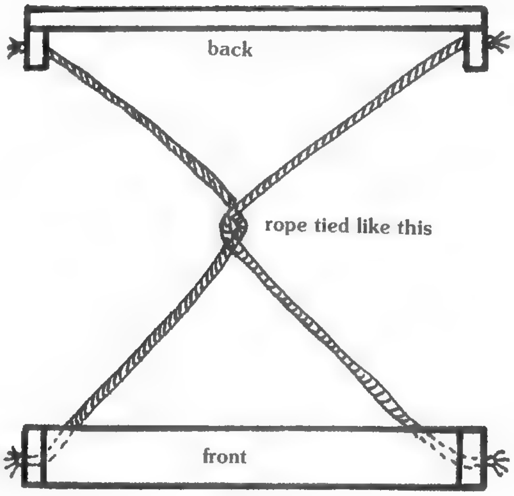

365 mm
310 mm
2½ mm clearance
1 inch steel water pipe
back board
12 mm threaded rod with nut and washer at each end
top rungs for straddling ladder
steps set in stiles 6 mm
bottom rung ties back stiles together
6 mm threaded rod — desirable, but not essential.
550 mm
500mm

Fig 5b. Front view.

The ladder will be more stable (and will look better) if it is tapered towards the top. The bottom rung should be at least 400 mm long, the top at least 300 mm.

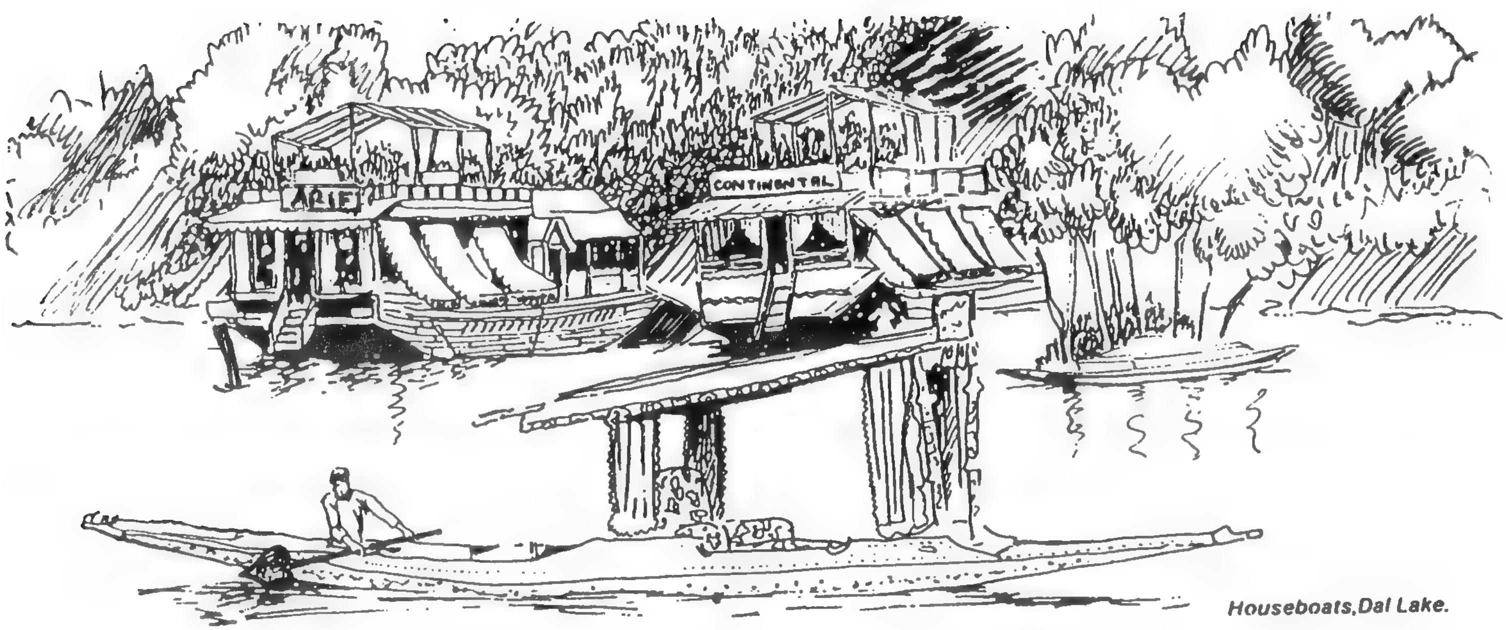
Intermediate lengths for rungs can be determined as shown. The boards being made into rungs are tacked together and clamped. A straight-edge is placed so that it is in the centre of the lengths of timber, at right angles to them. Use it to mark in a centre line on the top and bottom rungs. Measure half the desired length each way from the centre line on the top rung and similarly for the bottom rung. Remember to allow for the joints (6 or 10 mm depending on the timber used for the stiles). Draw lines joining corresponding end points from top to bottom. These lines then give ends of the intermediate rungs.

No new skills are involved in making a step ladder (**Fig 5**). The front is a tapering ladder like the one already described. The back can be made without rungs, except for a single one low down to tie the two stiles together. However, two or three rungs high up will make the step ladder more useful, because it can be straddled. As **Fig 5** shows, these back rungs need to be set on edge, to leave room for the front when in the closed position.



The two halves are joined at the top with a 12 mm threaded rod. The water-pipe spacer shown is essential, otherwise pressure of the nuts at each end of the rod will deform the stiles and make the ladder hard to open and close.

You can save a lot of money by making your own ladders. And if you can make a solid, safe ladder, you can build your house.


Houseboats,Dal Lake.

Indian Summer

By Liz Lewis

I didn't remember Delhi being so clean, green and open as it is. I hadn't expected the traffic to be so quiet — well, quiet compared to Bombay. But we weren't let down; there were still plenty of cows wandering loose. The Vespa-powered rickshaws still scooted and ducked about in the traffic with heart-stopping near misses.

"Is this the real India?" asked my seven-year-old son, Peter.

Later, down in the old city, we found the remembered 'real India': the crowded colourful, noisy, dirty narrow streets of Chandni Chowk, the pressing souvenir sellers outside the Red Fort, the clinging heat of midday Delhi.

Houseboat holiday

. . . Three days later, as we fly into Srinagar, capital of the Indian State of Jammu and Kashmir, the contrast was delightful. The open padi fields are being harvested and apple and pear orchards, walnut and mulberry trees rank along the roadsides. Snow-capped peaks, rocky, flowing rivers. Emperor Jahanjir was right when he called it 'Paradise on Earth'.

Hamid, Peter's hired ayah (nanny) was accompanying us to his home town. His two brothers, Nabbi and Rasool, had driven out to the airport to meet us. The bumpy drive took us through the quaint, crowded streets of Srinagar, then out along the Boulevard to Nehru Ghats, the steps where the houseboat water taxis called shikaras waited for business.

Our houseboat 'Continental' is moored away from the busy Jhelu River in a quiet corner of Golden Dal Lake amongst the vegetable gardens and chenar trees.

Each morning we are awakened by the Muezzin across the lake as from his minaret his beautiful quivering voice intones the 'Azan' leading the people in prayer.

Allahu Akbar	God is great
Ash hadu Alla-olahu alla-la	There is no God but God
Ashadu Anna Muhammadar Rusu lul-lah	Mohammed is a messenger of God
Hayya-Alal-Salah	I bear witness
Hayya-Alal-Falah	I bear it
La-illlaha allal-lah	There is no God but God

Then very shortly after that comes the clunk, splash of the next door farmer dropping his bucket into the lake and throwing water over his crop of sagg-spinach.

An emerald and turquoise kingfisher perches on the carved rail of the porch while the ladies in their farm shikaras paddle to the lotus beds to pull up lake weed to feed their sheep, goats and cattle, or to mulch their gardens.

Hussim comes in from the kitchen boat. "Breakfast ready Madam." Hot roti — bread, eggs, milk tea. Would we like Masala? Rice? Anything else?

The days pass quickly. A visit to Rasheed Shaw to take tea and view his silken carpets, traditionally woven from Kashmiri silk, dyed to the ancient muted colours for the patterns dating back hundreds of years. The weaver ties 400 knots to the square inch, the carpet taking nearly a year to grow to the full 8 ft length.

Or over the Sheik Kadir's papier mache factory where craftsmen patiently mould the minced paper and rag pulp moistened with rice water to the forms. Then, after drying them, add many layers of paint and lacquer, made from ancient and secret Persian recipes, so the colour never fades from its jewel-like glow. Finally, they apply pure gold leaf and varnish, to fill a room with vases, trays, bracelets, pots and other endless varieties of goods which give you the feeling of entering Alladin's Cave.

Or to be entertained by the charming salesmen who glide up to the steps of your houseboat offering Tibetan silver jewellery, turquoise and amber necklaces and religious Tankas. Another with a shikara full of fur hats, coats, jackets and mittens, or yet another with gemstones, a treasure trove of Afghan lapis lazuli, rich blue; Sri Lankan rose garnets, purple and mauve; amethysts, the palest leaf-green citrines; agates of all hues; orange, white and black moonstones, spread out winking and glittering on the silk cloth on the Kashmiri carpet.

Mohammed Bhat arrives with his chest of fragrant spices. We sit cross-legged on the porch, Hussim brings milk tea. Mr Bhat patiently opens each packet and jar and explains the origin of the contents. The most prized of the spices is the Kashmiri saffron. Flowering in November, the purple crocus flower yields three stamens . . . 7,500 flowers are needed to produce 500 grams of saffron spice. Best quality Mongara brings $17-$20 for 10g. Afghani cardamom, smelling like cough mixture, brings $56 a kg for green seeds. The cinnamon comes from Goa. The musk for perfume is from the musk glands of the Kashmiri deer and brings $14 for 10g. Mr Bhat also blends his own teas including the qaha green tea spiced with cardamom and cloves.

Rasool, the oldest of the Zandari brothers and manager of the family houseboats calls to chat. "The British started all this you know." He sucks on his hubble-bubble. "The Maharajah wouldn't allow them to buy land here, so with usual British ingenuity they invented the houseboats in which to stay on the Jhelum River or Nagain or Dal Lake during the hot season. In 1947, when they left, there were 50 houseboats, now there are 1,500."

Hussim, the bearer from Gulmarg, a beautiful nearby hill resort at 2,730m and known for its skiing, brings us a tray of samoosas (small pastry morsels filled with spiced vegetables) and a pot of Kashmiri spiced tea. Another kingfisher watches us from his perch on the mooring pole.

The greengrocer's shikara slides by, the boat full to the freeboards with mounds of glistening red tomatoes, deep purple shining aubergines, lumpy green marrows, nuggety brown potatoes, curls of crimson chillis, jade green cucumbers, tiny golden limes and snow white garlic surrounded by bunches of dark green sag. Mrs Zandari, the cook, buys fresh vegetables every day. Everything is cooked on a two-burner kerosene stove with a pressure cooker for the rice. At all times of the day deliciously fragrant clouds drift out of the doorway of the kitchen boat which is moored behind the houseboats.

The vegetables are locally grown in the floating gardens around the lake and on the shores of the lakes and river. All day the Kashmiri ladies are busy moving backwards and forwards in their farm shikaras, tending the garden and moving produce. You marvel that the boats don't sink under the huge weight of the piles of fodder or heaps of rich mud used to topdress the gardens.

A trip to the mountains

"Tomorrow we leave for the mountains!"

Hamid had been in conference with Rasool and his friend Sheik Nazir. "Nazir has to go to Aru to pick up trekkers, so the car will be empty going up."

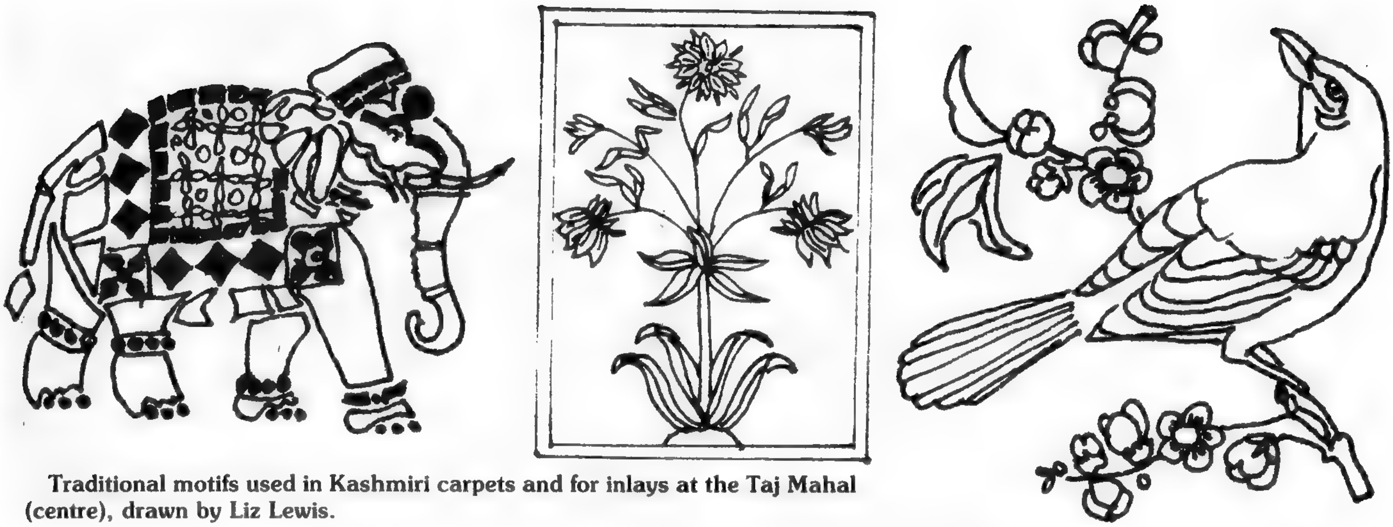
Shortly after the first calling of the Azan we were sleepily sipping tea and packing a few items to take up to the cool mountains. Already cool at 1,000 metres in the Vale of Kashmir, it would be quite chilly at night at 2,130 metres. "Bring only what is absolutely necessary," Hamid instructed. "Cheeky," I thought, I only travel with an overnight bag anyway. Peter's absolute necessities included his box of Leggo and a copy of Footrot Flats.

A sleepy Ishmael paddled us over to Nehru Park Ghats, the usually crowded steps being empty of hustlers and touts. We were soon driving through the empty streets of Srinagar in Nazir's Ambassador and out into the fertile Vale, with its walnut, apple and pear orchards, empty saffron fields, rice paddies golden yellow and ready for harvest. The agricultural land soon gave way to the steep slopes of the Himalayas as we headed up the Lidder Valley, its slopes clad in graceful giant deodars, poplar and fir trees.

We stopped in the tourist town of Palagum, Shepherd's Valley. The shop-lined street was fascinating with displays of all the local handcrafts. These included skins of local animals made into hats, jackets and coats, the carpets of loomed silk, silk and wool mix and pure wool, the colours muted and glowing, a tradition brought from Persia; the pashmima shawls, fleece of the local goats, so fine they can be drawn through a wedding ring; embroidery, vivid patterns in chainstitch or crewel. Then

Hamid and Peter on the carved porch of the Houseboat Continental on Golden Dal Lake.

A trip to the mountains. Peter and Hamid and timber chalets at the plateau village of Aru.



Traditional motifs used in Kashmiri carpets and for inlays at the Taj Mahal (centre), drawn by Liz Lewis.

we found what we wanted, the lassi wallah who whipped up milk curd in front of us, making sweet or sour lassi drinks, cool and delicious.

Across the road four men and a pony peered under the bonnet of a Morris Ambassador. Pony wallahs stood in groups, their ponies ready saddled, waiting to take Indian honeymoon couples on rides along the lower mountain trails.

Palagum is the startings place for the great Armanath yatra. This pilgrimage, which brings immeasurable merit to those who brave it, takes place each August. The six-day round trip is over rough sliding rocky trails to the Armanath Cave where the Hindu god Shiva is thought to have lived. The object of the pilgrimage is to worship the ice stalagmite which forms in the cave in the shape of the phallic lingam, the symbol of Shiva.

We arrived in Aru at the end of the road in time for lunch at the chi stall. Sitting at a rickety wooden table opposite a timber-covered mountain, eating omelettes and chapatis and soaking up golden sunshine, breathing air as crisp and fresh as a cold glass of reisling — my idea of bliss. Later the chowkiddar at the Government Rest House, Ali Mohammud, made room for us in his own tiny quarters. He and Hamid disappeared into the snug kitchen to confer over the leg of mutton we had bought on our way up the valley. Pete and I sat in the sun on the closely cropped grass surrounded by spectacular mountains and watched the shepherds grazing their flocks.

"Wherever you go, when you get to the top, there's always an Aussie!"

The two English trekkers, hot and dusty from their walk up from Palagum, were pleased to share Hamid's roast mutton with trimmings, though "What a surprise!". That evening passed very pleasantly as we swapped travel tales late into the night. Pete fell asleep curled up on a rug in front of the fire.

"Ask the shepherd if I can look at his sheep." We were wandering up the valley, taking in the spectacular mountain views surrounding the meadowed valley and enjoying the crisp morning air. Hamid translated the bakra wallah's replies. "The sheep are taken into the ground floor of the house when it starts to snow. During the winter, they lamb and later they are shorn and taken back to the mountain pastures when the snow melts. The sheep are naturally short-tailed.

"Half the flock has white wool, a quarter of the flock is black, with the rest brown. The wool grows to about 4 or 5 inches long and is very soft. We spin it on drop spindles as we watch over the flocks grazing. The rams run with the flocks all the time, but the lambs only come in the spring."

Further up the valley a farmer was ploughing his field, with his ox pulling a giant pickaxe-shaped plough. Half a dozen children followed, dropping seed potatoes into the furrow. A family sitting in their barricaded corn field invited us in to learn how to strip the husks. We were given hot roasted corn cobs to eat and offered ground and roasted meal also made from the corn. We talked of different farming methods used in Kashmir and Australia. The farmer being a bakra wallah too gave us lots of common ground and they were very friendly and hospitable. "Come and live in our house for a while," they said.

The mountain community raises poultry, milks cows and gathers fodder in summer which is hung in the trees to dry, making the trees look like they are growing beards. Much fodder is needed to tide them over the long harsh mountain winters.

A family of ducks paddle in the brook, chickens scratch in the cornstalks searching for missed kernels. Cucumber vines straggle over the timber fences and outhouses. Pony wallahs, skins bronze from the sun and cheeks ruddy, smoke a communal hookah.

"Time to go back to Srinagar?" "Oh no, not yet."

"Have many things to do." Hamid was insistent.

"Oh, alright, but my soul is staying here."

"Can I ride the pony back to Palagum?" Pete has discovered riding. The pony wallahs control the ponies with shrill whistles and trills.

Later, back in Palagum we sat in a cafe munching pakoras while Hamid searched for a car to take us back to the lake. Mrs Zandori had a meal of succulent curried lamb, roti, rice, vegetable masalas and tea waiting. We were almost too tired to eat.

Fishing

"Can I have ten rupees?"

"Where are you going Peter?"

"Hamid is taking me over to the shopboat to buy bait and hooks."

Patient hours later they had caught some fish. Great excitement.

"Can you eat them?"

"No, they're too rough, but tonight we'll go over to open lake and catch pomfry."

The Red Fort

Three weeks later, back in Delhi.

Pannikers Tours were living up to their name. The paranoia of keeping to their time schedule on the 'Agra Day Tour' on a day that was mimicking the monsoons was reflected in the rush from sight to sight, which we were not enjoying.

"Oh no, madam, I am telling you that the monsoons are finished, what we are having now is simply rain." The English-speaking guide was totally incomprehensibe. "What language is he speaking?" asked Pete.

We wandered off on our own to explore the Red Fort. Two charming young university graduates approached us. "We are thinking that you are not knowing what the guide is telling!"

I shrugged and smiled, "It's alright, I've been here before."

"Madam, we will tell you what he is saying." And so they did, word for word. We learned about the ruling Moghuls who had built the fort and the invading Afghans under Shah Humayan later regaining control, but he soon died, leaving it all to Akbar the Mogul . . .all very confusing to a seven-year-old, who eventually asked, "But who won the war?"

"Well Peter, funnily enough neither won the war. That particular problem was solved by the British taking over for a couple of hundred years, which in itself caused more problems when the Indians were ready to resume ruling their own country."

"Oh, you mean that Gandhi stuff."

The Taj Tour

"Postcards madam?"

"No, but I'll hire your umbrella."

Every other tourist who has seen the Taj Mahal saw it by moonlight, at sunset, at sunrise, across the river, but we saw the Taj in pouring rain. We paddled in 3 inches of water on the marble terraces. The mortuary chamber was scattered with plastic buckets to catch the streams of water running in. It was noted in the next day's 'Times of India' that Prince Aurangzeb had had to have a leak plugged with molten siver as recently as 1653.

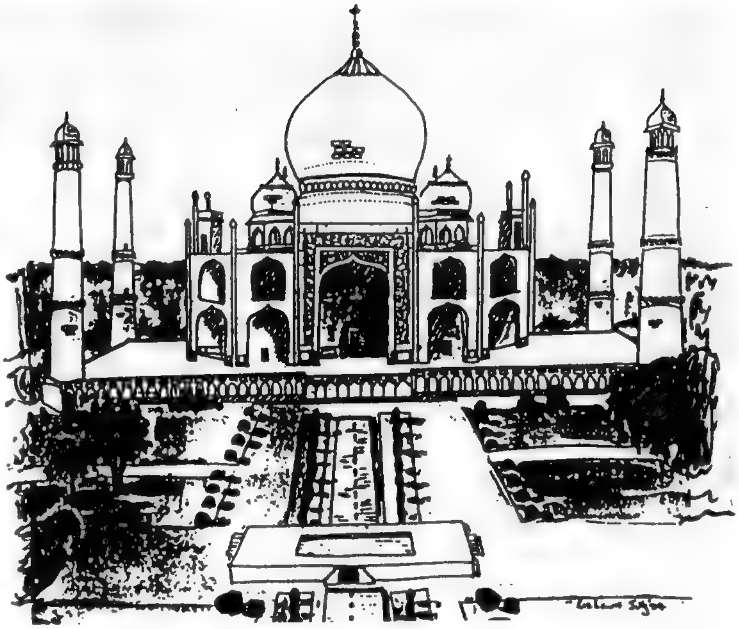
Nevertheless, the first glimpse you get of the Taj as you climb the steps of the entry gateway is overpowering. As before, I was again reduced to tears, immobilised on the top step, taking in its symmetrical beauty and size.

"This is amazing." Peter was equally stunned.

We weren't let down. Despite the rain, the buffalo powered lawn mower was on duty. The Taj reflected in the shining wet marble pavements. The leaden sky added a mystic light to the incredible loveliness of this magnificent tomb. As we approached along the 300 metre walkway the intricate designs of inlaid semi-precious stones became visible, glowing in the soft light. Inside we marvelled at the 2 metre high marble screens hand-carved like fragile lace, surrounding the two commemorative cenotaphs in the chamber, constructed over the real tombs in the crypt below, so that none may walk over the heads of the King and Queen.

After a solemn walk around the building, taking in its size, the 20 years of labour, the precious stones set in the marble, the carvings, the height of the dome, the four minarets and the picturesque gardens, Peter decided "If Shah Jahan hadn't spent all that money on this, perhaps India wouldn't be such a poor country."

Ah, but wouldn't the world be a poorer place?



Travel notes

When we went: September-October, off-season for air fares, advance purchase return to Delhi, $980.00 full fare.

Weather: Delhi area, hot, muggy days, warm nights. Kashmir, warm clear days, cool clear nights. Himalayas, warm clear days, cold clear nights.

Documents: Australians require an Indian visa, initially valid for 90 days.

Health: Up-to-date cholera, typhoid, tetanus and polio vaccination and malaria tablets.

Currency: $A1 = Rs 8.3.

Finance: India is still a cheap country for Australians. It's possible to manage on a $A20 a day — just — $A50 is more comfortable, but you would still need to avoid international hotels and take buses instead of taxis.

Where we stayed: Delhi, Maharani Guest House in the suburbs, very comfortable and modern, 350 rupees a day for a double room with en-suite; Ashok Yatri Nivas, near Connaught Circle, Rs 115 per day for a double, spartan clean government high-rise hotel. Srinagar, Houseboat Continental, 1930s British chintz, excellent service and comfort, Rs 350 per day all found, including use of own shikara. Aru, government resthouse, Rs 20 each, meals extra, clean, spartan and friendly.

All India Travel

For further information on houseboats on Golden Dal Lake, tours of Delhi, Agra, Fatephur Sikri, Jaipur and Amber and trekking, fishing, shooting and skiing in the Himalayas (Kashmir and Ladakh), send SAE to Liz Lewis, 161 Adelaide Road, Hahndorf, SA, 5245.

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HARD TIMES HINTS

John Guest of Yeppoon, Queensland, who contributed **Tips for battlers** to the 'Tucker' section of **HARD TIMES HANDBOOK,** has sent up quite a lot more useful tips and hints, feedback on the book and some reminiscences. As John says: "If all **Earth Garden** readers sent in a few hints like this, the next edition of HARD TIMES HANDBOOK should be ten times the size." What about it?

By John Guest

When I was a boy in England our family had what was called a **Valor** stove. It looked something like the tall, cylindrical stoves illustrated in HARD TIMES HANDBOOK, but it ran on kero. I remember when I was sick looking at the shadow pattern on the ceiling from the perforations on the top. Every now and again, I would wake up to find no shadow on the ceiling and a kettle or saucepan on the stove.

It was made of thick sheet metal and had a handle that allowed it to be carried about while alight. It was probably heavy on juice, but it was convenient.

You mention of the **Alladin** kerosene lamp that has a mantle without pressure reminds me that my Mother told me that when she was first married we lived in a little cottage and used one of these lamps for lighting. Strangers would knock on the door at night to ask what kind of light we had, as electricity was completely unknown in the little hamlet where I was born and ours was an unusually bright light.

I remember, I remember in the days when I was young, my Mother had a **steamer** but of a different design than those you mention on page 130. It was like another alumium, saucepan that fitted on top of the saucepan on the heat and had a perforated bottom.

Cod's heads for 'Bones'

Once upon a time a stray cat with the loudest Miaow we had ever heard and in the last stages of starvation presented himself at our back door. He was very nervous, but Mother felt sorry for him and we went down to the fishmonger and asked for five cod's heads for our cat. Cod's heads at that time cost nothing as the fishmonger gave them away. Mother boiled the cod's heads and gave one to the cat, who polished if off in jig time and Miaowed for more.

Well, that cat ate three of those cod's heads and doubled in size! He was little more than skin and bone to start with, but swelled visibly. Mother took a long hard look at those cod's heads and found the fish had a lot of meat on its cheeks, so in future Bones, as he came to be called, had cod's heads ordered on his behalf regularly. We had fishcakes the same day. This was in wartime, when an extra source of food was very welcome.

Washdays

You may have heard an English song about 'My darling', who was 'a-washing of her linen oh!' on Monday, 'a-ironing of her linen oh!' on Tuesday and so on, through the week? Well, that lady's activities make a lot of sense if you are economically minded, since doing all the washing on one day and all the ironing on another day would certainly save fuel and water.

I can remember in our family, that Sunday was my Mother's baking day, when enough cakes and tarts were baked for the family, for the week. We bought our (white) bread and the big Sunday roast went in the oven. On Monday we came home from school to a dinner of cold roast beef, Monday's boiled potatoes sliced thick and fried in the drippings and pickles. Occasionally, if the wash was not too heavy, we got bubble-and-squeak instead.

Tuesday we often found Shepherd's Pie for dinner and that just about put paid to Sunday's roast. Wednesday, we might get Toad in the hole, so here's a recipe which I can recommend.

TOAD IN THE HOLE

Place a layer of sausages in the bottom of a pie dish. Fill the pie dish with Yorkshire pudding batter, bake in the oven for about ¾ hour and serve it with vegetables in season.

SALTED BEANS

With our Toad in the hole we often had runner beans that had been salted down. You salt the beans by slicing them thin, top and tail them, then pack them in jars with salt all over them and in amongst them. I think Mum used to pour off the juice, then put in more salt and beans. I know they were not cooked in any way before they came out of the jar and had the salt washed out of them. **Note:** We gave a fuller version of this in **Earth Garden 12** (page 43).

CHINESE ONIONS & KIDNEY

I have tried out the recipe for **Polish potato cakes** (Kremslach). I like them. Many years ago I bought a book on Chinese cookery. Like most cookery books, the majority of the recipes were complicated and called for many ingredients and careful cooking, except for one.

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Take a large onion and a kidney about the same size as the onion. Slice thickly, say about ¼ inch. Sprinkle generously with salt. Place in a pan, first a slice of kidney, then a slice of onion and so on, like a Hero sandwich, then fry. I can recommend it if you want something tasty.

CUCUMBER SALAD

This is the way my Aunt Maggie prepared cucumbers. You slice the cucumber and sprinkle the slices with sugar and vinegar. Let it stand for about half an hour.

COLCANNON

I am surprised you did not include Colcannon in your potato recipes. It is a plate of mashed potato with a big knob of butter in the dip in the middle and a side dish of leeks. You dip the leek in the butter, then the potato and scoop up a bit of potato. I learned this recipe from a Jewish Rabbi who wrote a cookery column for the English Catholic weekly, The Universe, He got it from an Irish lady he was billeted with as a child in the First World War.

TO KEEP MARGARINE FIRM

To keep margarine firm in warm climates, place the margarine in a large jar. I find big, ornate coffee jars best serve the purpose. Then fill the jar with bicarbonate of sóda and water. I have not yet worked out the ideal percentage of bi-carb soda, but it is not critical.

BOTTLE TOPS

To unscrew a stubborn bottle top, jamb the cap in the hinge side of a door and twist the bottle. I have never known this to fail. **Note:** We sometimes use this method for unscrewing 'unshiftable' lids of glass jars. It works, but it is hard on the kitchen door! (Irene & Keith).

CHILI LINIMENT

I must tell you about my chili liniment. You take a bottle of baby oil. Pour out a little of the oil and put a handful of Birdseye chilis in the bottle. Let it stand until the oil turns a glorious orange colour. Believe me, it is better than all your commercial concoctions!

TWIG TOOTHBRUSH

On the subject of cleaning teeth, I must mention the old Boy Scout method. Chew a twig until the end is like a brush (Aboriginal artists do this), then brush your teeth with it.

GUMLEAF REMEDY

Here is a native herbal cure. When in India I was told that the Australian gum trees introduced there are held in high regard as a headache cure. You just rub gum leaves on your forehead.

PROTECTING SEEDS FROM ANTS

There is a simple way to stop ants making off with your seeds in the garden. Rub the seeds with a rag soaked in kerosene. The ants (and birds too, for that matter) will not touch the tained seeds.

SEXING CHICKENS

Did I ever tell you that you can tell a male chick from a female day old chick by looking at the wings? The hens have larger, more developed feathers on the underside trailing edge.

EASY RESUSCITATION

Place the drowning peron across your back, face down. Clear the air passages, then rock from side to side. The weight of the patient's stomach forces air out of the lungs when the head is down and sucks air in when the legs go down. Get someone to put you across their back and do this while you hold your breath!

LOG LEVEL

When the Canadians build a log cabin, they make sure the logs are level by placing a saucer of water on them. If the water if the saucer is level, then so is the log!

CLEANING BOTTLES

Another way to clean the insides of glass bottles and decanters is to put in about a teaspoonful of dry rice and an inch or so of water. Then shake like a feverish maracca player.

FLOOR STAIN

The methods for staining floors in the Household Hints section of HARD TIMES HANDBOOK do not mention potassium permaganate, or Condy's Crystals as some people call it. I remember when young we moved into a big house where our carpets would not reach the walls by a long way. Well, my parents did not like the idea of looking at bare boards, so they got to work with some hot water and permaganate of potash. The boards turned a very dark brown colour. I have been told that it should be mixed with Epsom Salts (magnesium sulphate), but neither I nor my friendly neighbourhood chemist can think what difference this addition would make to the stain.

PRESERVING PASTE

You say that flour and water paste goes 'off' after a week! If you add to the water you make it with enough Dettol to make it cloudy, it will keep indefinitely. I make my own office paste that way. It oftimes goes unused for months on end without going mouldy, until I make a fresh lot to keep me going.

ENERGY WORKS! EXTRA

We regret to inform readers that Tony Stevenson of Survival Technology, who wrote Electricity from the Wind in the Windworks section of Energy Works! (also in Earth Garden 46), died suddenly late last year. Tony was a wind generator enthusiast and a pioneer in the fledgling alternative energy movement in Australia through his involvement with advice, sales and installations for clients and also through the Alternative Technology Association. His energies will be sadly missed.

The shop and business of Survival Technology, Croydon, Victoria, has closed and all letters are being returned unopened to senders.

UPDATES, COMMENTS & CORRECTIONS

KEITH SMITH: **Energy Works!** is full of practical information on renewable sources of energy (specially solar electric systems) which up to now has been pretty scarce in Australia. Though written with the idea that anybody should be able to understand it, the book has also been well received by technical people. We caught a few bloopers before going to press, but not surprisingly some errors have crept in and a few updates are already needed in this rapidly evolving field.

This **Energy Works! Extra** is intended to make the book even more useful to its readers (2,000 of you so far!).

For example, you'll look in vain for Lindsay Corben's windpump in the photo on page 60 because I chose a different photo! The light which is turned on on the first page and turned off on the last is shown sideways. Apologies to Bob and Jolanda Rich of Moora Moora who allowed me to take these photos of their 12V toilet light.

Tamar Designs Pty Ltd advise us that their 24V and 12V DC Pelton Wheel is rated at 350W and not 150W as we had it at the top of page 151.

First off, Peter van der Wyk has some further information, comments and corrections to make about some of the many articles he contributed to **Energy Works!**

BICYCLE WHEEL WIND GENERATOR

PETER VAN DER WYK: Firstly, I should say that the propeller type **Bicycle wheel wind generator** (page 8) is simpler to build than the Savonius or **S-rotor bicycle wheel generator** (page 91) and has proved to be a much better performer. Since writing the original story I have used aluminium printing plates in place of galvanised sheet metal to make the propeller blades and found them much easier to work with and just as durable. It was mostly a matter of what was on hand.

I also stated that the rim dynamo must touch the tyre at all times. The percentage of time that the dynamo touches the tyre is dependent upon how true the wheel is and the state of the tyre on it. With a lot of trial and error and measuring the output under different conditions, I found that it is not necessary for the Sanyo Dynapower dynamo to be riding on the tyre for the complete revolution of the wheel. In fact it was advantageous to have the dynamo not touching the tyre for a fraction of the rotation of the wheel so the wheel could manage to pick up a little speed in light winds. During these moments the dynamo would continue spinning after the momentum it picked up from the tyre until it again came into contact with the tyre and so the energy gained was greater than the energy lost.

In that same article I mentioned fitting the tyre and tube and filling the tube with air. Again, I have found that it is not necessary to fit a tube at all, because the Sanyo Dynapower operates on so little friction with the tyre that any worn out old tyre with a smooth tread and no tube will perform better than a new tyre. A new tyre creates more friction due to its tread. By not having a tube the wheel is more balanced as it does not have a valve. By not having the tyre pumped up the pressure against the dynamo is easier to keep down to a minimum, thus keeping the frictional losses to a miniumum. As the wind speed increases, a deflated tyre acts like a centrifugal clutch and transfers more power to the dynamo and the dynamo in turn generates more charge for the batteries.

On page 88 the caption next to the drawing of the Dynohub is not quite correct. The Sturmey Archer Dynohub does not turn on the hub in the centre of the wheel, it is the hub in the centre of the wheel. It is made up of a stationary winding which is fixed to the axle and a rotating magnet which is fixed to that part of the hub which rotates with the rest of the wheel, so a better caption would be:

"Hub dynamo. Sturmey Archer Dynohub is a multi-pole generator which operates around the axle of the wheel."

In my article **Converting to 12 Volts** (page 182), there is a mistake in relation to amps used by different contraptions. A portable black-and-white TV draws about 1 amp, whereas a small colour TV (Philips portable colour TV) draws about 2.5 to 3 amps.

The drawing of the **programmable timer** on page 184 is upside down.

BUILD A SOLAR COLLECTOR

RODNEY JENSEN: In the diagram (lower right of page 147) illustrating solar collector connections to a gravity feed water storage tank, the parts of the system labelled 'Hot water' and 'cold water' should be switched.

Cold water normally enters such a tank via a cistern valve and hot water tees of the expansion elbow. Although there are still many such systems in old houses, mine included, modern tanks are different, with appropriate connections clearly labelled. It should be noted that this work is required by law to be undertaken by a licensed plumber.

Safety First

LOW VOLTAGE WIRING STANDARDS

A statement from the Energy Authority of NSW

Articles on low voltage wiring by Peter van der Wyk and Greg Baker in Earth Garden No 44 (November, 1984) — and also in our book, Energy Works! — have prompted the Energy Authority of New South Wales to point out the requirements for ensuring maximum electrical safety. We reprint the Authority's statement in full.

Legislation relating to the safety of electrical installations in NSW, **The Consumers Electrical Installations (Safety) Regulations**, under the Electricity Development Act, 1945, require that installations connected to an electrical supply authority grid system comply with Australian Standard AS 3000 — 1981, known as the SAA Wiring Rules. Although not covered by legislation, it is also considered important that installations supplied independently of the electricity supply authority's system should also comply with this standard.

To ensure that an independent installation complies with essential safety requirements, the installation should be inspected and tested to AS 3000 1981 by a qualified person such as a registered electrical contractor or where practicable an electricity supply authority inspector.

The Australian Standard AS 3000 "enumerates the essential requirements for ensuring safety from fire and shock relating to all electrical installations in or on buildings, structures and premises" . . . (exemptions concerning supply authorities' wiring and equipment are also given).

The Standard contains sections on General Requirements, General Arrangement, Control and Protection, Installation of Wiring, Installation of Equipment, Earthing, Special Situations, Extra Low Voltage Installations, High Voltage Installations, Hazardous Areas, various tables and data.

With regard to the Earth Garden articles which referred to low voltage wiring and its installation, Section 7, Extra Low Voltage Installations, is of particular relevance to the type of installation discussed.

Clause 7.15.3.1 relates to bare conductors, and states that "where bare conductors other than bare aerial conductors are used they shall be installed:

(a) not less than 0.6 m from floor level area; and
(b) open to view throughout their entire length."

Insulated conductors are preferred (Clause 7.15.1.1), with insulation having a nominal radial thickness of not less than 0.4 mm PVC or its equivalent. Open wiring should comply with Clause 3.17 which designates the type of use, clearance, support of cables, protection where liable to damage, passage through walls, etc.

The purpose of complying with this Australian standard is to ensure safety from electric shock and fire, factors which remain relevant at low voltages (not exceeding 32 V AC or 115 V DC) as well as the more predominant 240 V, 415 V AC systems.

From studies undertaken of accidents due to electric shock the voltage below 55 V can produce shock systems (respiratory difficulty and heart problems), particularly where body resistance is reduced by the presence of moisture, bare feet and other circumstances.

The capacity of an extra low voltage system may be sufficient to initiate a fire should cables be damaged due to improper materials and inadequate installation methods.

For a better knowledge of electrical wiring, a McGraw Hill publication, **Australian Electrical Wiring Theory and Practice,** and **Standard AS 3000 — SAA Wiring Rules,** published by the Standards Association of North Sydney are recommended.

It should always be remembered that electricity is a safe energy source when handled and used correctly, but the importance of using the recommended methods, equipment and procedures cannot be too highly stressed to ensure maximum safety to plant and people.

Battered batteries

By Chris Martin

In **Energy off the shelf** in Earth Garden 44 (and in Energy Works!), we wrote about problems we were experiencing with our Besco batteries. We thought then that the main cause was due to incompatibility between these and the Century batteries also in our battery bank. How wrong we were!

We offered the Besco batteries for sale and although we had a bit of interest, we did not sell any (luckily). Towards the end of summer 1984, four out of the eight batteries collapsed with dead cells everywhere. Originally our supplier had recommended that we purchase Century batteries, but as we already had two Besco batteries, we felt more or less committed.

We discussed the matter and sent a letter together with supporting comments from the supplier to Besco. No reply was received, so we took the four batteries down to them in Sydney. There we discussed the situation with the NSW Sales Manager and left the batteries with their technical section for testing.

We were also given a pamphlet on the Besco range of batteries and were dismayed to find this statement regarding the Amp Power batteries we had been using.

> "Multiple parallelling is not recommended because minor internal differences are difficult to balance out and uneven discharging and recharging will occur. Bearing in mind there is only a limited amount of energy available for charging some cells in, some batteries may not get their share. IF ONE CELL IN ANY BATTERY BECOMES DEFECTIVE, ALL OTHERS WILL DISCHARGE INTO THE FAULTY BATTERY.

It is fair to comment that there was no such statement in the original Besco brochures which extolled the virtues of the Amp Power range for solar power applications. It is now obvious that for any reasonably sized battery bank, batteries should be wired in series, or a large motive power battery to the capacity and voltage required should be purchased.

Besco did replace the batteries at wholesale cost and eventually recovered two of the batteries with dead cells, but only after using sophisticated mains-operated equipment not available to us.

EG readers contemplating battery purchases should consider these problems as our little exercise has cost us some $800 in replacement batteries after only 18 months of use in a low energy consumption home.

Sulphation. In EG45 Peter van der Wyk further expanded on sulphation problems experienced when leaving batteries in a partially charged state for a period of time. He suggested that the batteries should be charged on a trickle cycle for 15-30 days. I have since received further information, including a formula for a de-sulphation cycle.

1. Double the amp hour (Ah) rate for the battery, that is 180 Ah in the case of a 90 Ah battery, or 320 Ah for a 160 Ah battery.
2. Divide the figure by 100 and charge for a minimum of 100 hours, at the amp rate calculated, for example about 2 amps for 100 hours for a 90 Ah battery or about 3-3.5 amps for 100 hours for a 160 Ah battery.

I was warned that sulphation can lead to antimony poisoning of the battery and because of this an attempt to recover a badly sulphated battery may fail.

Batteries seem to be the bane of alternative energy systems. Members of the Appropriate Technology Association of Australia are obviously not satisfied with those currently on the market as they have requested a number of manufacturers to design a battery specifically for alternative energy use. I was told there is a possibility that the proposed battery may have round plates to alleviate the problem of sulphation. Besco was not among those asked to assist.

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SOLAR INCINERATOR HOT WATER

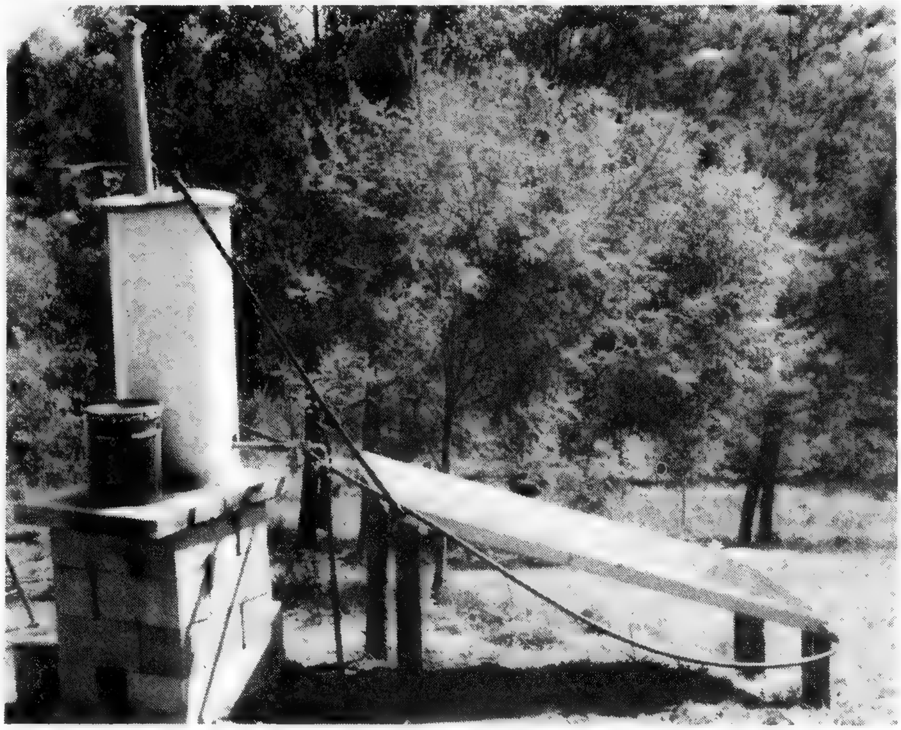
By Peter van der Wyk

This is an update on my original incinerator hot water service outlined in **Earth Garden 43**. The one shown in the photograph belongs to one of my neighbours. The incinerator itself was made from concrete blocks with a cement base and a cement top that he poured himself.

While building this system he added a pressure reduction valve and a secondhand solar collector which thermosyphons into the converted gas hot water tank on top of the incinerator.

The water power is reduced to 60 pounds per square inch (psi) so it is not likely to do damage to either the solar collector or the gas hot water tank. Whether or not this step is necessary depends on the initial water pressure.

For the thermosyphon to work, the solar collector must be below the bottom of the tank with as few bends in the hose or pipe as possible. The higher end of the solar collector is connected as directly as possible to the top of the tank. The pipe going to the top of the tank needs to be insulated.



To stop cold air going through the flue of the gas hot water tank it is a good idea to place a ball on top of the flue whenever you don't have a fire going to heat the water.

My neighbour has had this system functioning for a few months now and he nearly always has a surplus of hot water.

immersion heaters

In **Earth Garden 48**, Alan and Annie Richardson asked for details of "an iron rod with prongs" (elements) used to heat cold water. These responses from readers provide more information and some cautions about electric immersion heaters, also known as heater elements.

CLAUDE WISPELAERE, East Brunswick, Victoria: The gadget can be bought from Radio Parts, 562 Spencer Street, West Melbourne, Victoria, 3003, phone: (03) 329 7888. There are two models:

☐ DIH **Birko** Immersion Heater, 1200 watts, Cat. No. 2145 0510, $12.10.

☐ H62 **Birko** Immersion Heater, 2300 watts, Cat. No. 2145 1620, $25.96.

Being mean and lucky enough to find an old washing machine with a heating element that was still okay, I bent its heating element into the right shape (it's easy) and attached a cord and a plug. I use it when running out of hot water. Mine is only 650W and will heat a bath in 15 minutes.

Warning: I believe the gadget to be dangerous and you would be wise to stay clear of the water and the bath tub when it is switched ON.

DAVID McKITRICK, Birkdale, Queensland: I have a **Birko** 240V, 2400 W immersion heater which I bought six years ago from an electrical retail firm in Brisbane. We used it to heat up bath water when we had no hot water system. A half-filled bathtub takes about half-an-hour at least to heat up nice and hot. They last at least a few years, then they burn out — especially if the plug isn't in properly and the water runs out of the bath, which happened to us a few times before our first one burnt out!

It has a 45 cm long element similar to some of those used in heating jugs, which goes red hot when there is no water in the bath. Cool it down gently if this happens by turning off the power and leave it alone, or it will crack inside. It's perfectly safe because you turn it off before you get into the bath. Contact Birko, 26 Victoria Crescent, Abbotsford (Melbourne), Victoria, 3063 for further information. Phone: (03) 41 9433.

CHRIS MARTIN, Coonabarabran, NSW: **Grimwood** makes a 240V, 2400W heater element that looks like a giant electric jug element, which is available locally in Coonabarabran at $40.00. I think larger industrial ones are made for the food industry, but these are probably stainless steel and very expensive.

PETER VAN DER WYK: These elements to heat up bath water are readily available and require 240V and many thousands of watts to operate. I would say such a device is out of the question for people who are considering generating their own electricity.

As I have stated in previous Earth Gardens, it is very inefficient to use electricity to generate heat. It is like creating a massive short-circuit (and watch the wires start melting). The most sensible alternatives would be to use either a solar hot water system or any number of fuels to heat water with fire

SECOND BIOLOGICAL FARMING SEMINAR

Hawkesbury Agricultural College, Richmond, NSW, Saturday, March 22, 1986.

The seminar on ecologically sound methods of farming originally scheduled for last December will now take place on March 22. Speakers include Dr Richard Bawden on sustainable agriculture, Michael Roads on organic farming, Robyn Francis on Permaculture farm design, Ross Macindoe on the role of pigs, poultry and bees in diversified organic farming and Gil Wahlquist of Botobolar Vineyard on ecological farming of wine grapes.

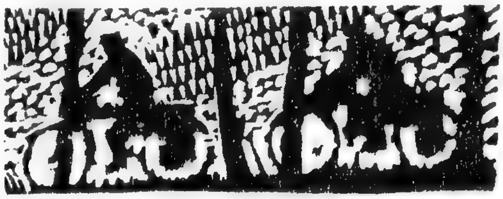
Cost is $45.00, including morning and afternoon tea and literature. To register, please contact Warren Kissell on (045) 70 1455, or write to HAWKAID, PO Box 415, Richmond, NSW 2753.

access

THE BIKE RIDE

The Bike Ride leaves Adelaide at the end of the Arts Festival on Palm Sunday, March 30, to cycle around Australia, visiting the links in Australia's nuclear chain — uranium mines, nuclear installations and foreign bases — eventually arriving at Pine Gap. Along the way community workshops, slide shows, radio and TV interviews, music and other events will focus on ending nuclear involvement in Australia, including visits by nuclear warships, in this the International Year of Peace.

☐ You can take part, give support or obtain further information by contacting The Bike Ride, C/-Friends of the Earth, 366 Smith Street, Collingwood, Victoria 3066; Greenpeace, 155 Pine Street, Adelaide, SA 5000 or MAUM, 787 George Street, Sydney, NSW 2000.



WHEATGRASS CLASSES

Dr Ann Wigmore's famous 'live food' wheatgrass programme developed in Boston, USA, is now being taught and applied in three week courses at Hippocrates Health Centre of Australia at Mudgeeraba, Queensland.

Send SAE for further details to Hippocrates Health Centre of Australia, 21 Monaro Road, Mudgeeraba, Qld 4213, or phone (075) 30 2860.

Soper with Chaucer

A Medieval feast for four people

Based on dishes mentioned in **The Canterbury Tales** by Geoffrey Chaucer, 1386
From recipes in **The Forme of Cury**, 1390 and **A Boke of Kokery** (Harleian MS 4016), 1450

Tested, tasted and recreated
By Keith Vincent Smith

The Menu

Slete soppes (Leek soup)
Pies of Parys (Pork & veal mince pie)
Blanc manger (Chicken & almonds)

Side dishes

Salat (Sharp herb salad)
Perry of Peson (Puree of peas)
Peeres in confyt (Pears in wine syrup)

On the Table

White tablecloth
Mead, wine or cider
Trencher bread & wine goblets
Each place set with cloth napkin, spoon & knife
Candles, salt cellar
Ewer or basin or water with towel

The illustration shows the pilgrims at table, from *The Canterbury Tales*, printed by Richard Pynson, 1526.

In **The Canterbury Tales,** written about 1386-9, Geoffrey Chaucer (1340-1400) left a vivid record of social life in England during the Middle Ages. His 24 tales, long or short, bawdy or serious, show us the wit, the character, the morals and the conceits of his times.

There is no better person to introduce us to a taste of Medieval meals and manners, of which we find many lively descriptions written by this poet and courtier whose father and grandfather had both been wine merchants.

Chaucer gives us good dining manners with the Prioress, Madame Eglentyne:

She leet no morsel from her lippes fall.	She leet no morsel from her lippes fall,
Ne wet hir fyngres in hir sauce depe.	Ne wet hir fyngres in hir sauce depe.
Wel coude she carie a morsel, and wel kepe.	Wel coude she carie a morsel, and wel kepe,
That no drope ne fille up-on hir brest.	That no drope ne fille up-on hir brest.

Such delicacy at table was extremely difficult because, at the time, forks were unknown in England (where they were not used generally until the 17th century) and most meat dishes were more or less liquid *pottages* or puddings. These were eaten with a spoon, or scooped up with a *sop,* a piece of bread or toast about the size of two fingers, which was also used for dipping in sauce.

At meals a *messe* or helping for four people was turned out onto *trenchers* made from thick slices of stale (usually four or five days old), coarse bread, sliced and chipped into squares and used as we now use plates. At the end of the meal, the sodden trenchers were removed in a *voyder* (or voider), a tray or basket used for scraps. These were sometimes eaten, or kept to use as sops in a following dinner. At grand houses they might be given to the poor, or fed to the dogs.

Chaucer gives us courtersy with the Squyer, the Knight's son, aged twenty and described as *a lovyere, and a lusty bacheler,* though:

Curteys he was, lowly and servisable.	Curteys he was, lowly and servisable,
And carf biforn his fader at the table.	And carf biforn his fader at the table.

The office of a carver (or *kerver)* was one of distinction in noble homes, rather than being a menial task. There was a rigid set of rules for the different methods of carving the great variety of meat and game (including swans, cranes and porpoises) roasted on the spit or baked in separate bakehouse ovens on the estate.

Among the *Termes of a kerver* included in **The boke of kervynge,** printed in London in 1508 by William Caxton's successor Wynken de Worde, were instructions to:

sauce that capon	sauce that capon
spoyle that henne	spoyle that henne
unlace that conye	unlace that conye
dysplaye that crane	dysplaye that crane
alaye that fesande	alaye that fesande
wynge that quayle	wynge that quayle
mynce that plover	mynce that plover
tayme that crabbe	tayme that crabbe
barbe that lopster	barbe that lopster

A cook with ladle and iron pot, from *De proprietabatibus rerum* by Bartholomaeus Anglicus, printed by Wynken de Worde, 1495.

There are full explanations of the rigid rules and methods of carving, serving, making trencher bread and menus and discussions on the best foods and sauces in my facsimilie copy of this book, printed by Da Capo Press in Amsterdam in 1971. To *Sauce that capon,* a carver was instructed to *Take up a capon & lyfte up the ryght legge and the rygh wynge & so araye hym forth & laye in the plater.* The fesande (pheasant) had its legs and wings lifted and was salted, while the crane was displayed by cutting off the wings and joints and dressing with sauce . . . and so on.

In the figure of the cook Roger (or Hodge) of Ware in London, Chaucer gives us the plain cookery of the poorer sort in the cities who bought their food at street markets, taverns and bakehouses:

A COOK they hadde with hem for the nones.	A COOK they hadde with hem for the nones,
To boille the chiknes with the marybones.	To boille the chiknes with the marybones,
And poudre — marchant tart. and galingale.	And poudre-marchant tart, and galingale.
Wel coude he know a draughte of London ale.	Wel coude he know a draughte of London ale.
He coude roste. and sethe. and broille. and frye.	He coude roste, and sethe, and broille, and frye,
Maken mortreux. and wel bake a pye.	Maken mortreux, and wel bake a pye.
. . . For blankmanger. that made he with the beste.	. . . For blankmanger, that made he with the beste.

Roger could roast, boil (sethe), broil, fry, make stews, sauces, pies and spiced *(poudre-marchant)* tarts, all skills maintained by today's 'plain' cooks. Though he is given a scant three pages covering the *Prologue,* the unfinished *Cokes Tale* and *The Manciples Prologue,* the portrait of Roger's character is well rounded. We see him accused by the pilgrims' host of selling:

Many a Jakke of Dover (sole) *that hath been twyes hoot and twyes cold* and earning *Cristes curs* from pilgrims who had eaten his *stubble-goos for in thy shoppe is many a flye loos.* This jolly cook had little care for hygiene as he has an open sore on his shin. As he rides along, he likes to take a swig of wine and eventually he falls down dead drunk from his horse as the party nears the town of *Bob-up-and-doun,* not far from Canterbury.

Marybones were what we call the juicy marrowbone meat found today in dishes like Osso bucco. *Galingale* was a powdered spice from the root of an aromatic sedge from the Indies, quite often an ingredient of *galyntyne,* a pungent sauce much used in Medieval cookery to accompany fish, flesh or fowl. A recipe for galantyne from 1390 calls for brown bread crusts soaked in vinegar with cinnamon, galingale and ginger steeped in it, with the liquor being later straind off. Galantyne was served over pork fillets at the lavish coronation banquet of King Henry IV in 1399, the year before Chaucer's death. A ginger sauce would be a suitable substitute today.

Mortreux (or mortrews) was a pottage of meat and other ingredients which got its name because the food was ground up in a mortar. It could be served either as a thick soup, stew or even as a *pate.* London ale was probably safer to drink than polluted Thames water and was often used in cookery, being added to stews and used as a leaven or *balm* in bread and pastries.

Blankmanger (meaning 'white dish'), quite unlike our modern blancmange, was a mash of chicken pieces (or sometimes fish) mixed with rice and almonds, or cooked in almond 'milk'. In the 16th century it was described (more appropriately I think) as *blank-mangle.*

Finally, Chaucer gives us feasts, with the Frankeleyn, a country gentleman who leased land from the lordly owner and who was described as *Epicurus owne sonne.*

With-out bake mete was never his hous,
Of fish and flesh, and that so plentyous,
It snewed in his hous of mete and drinke,
Of all deyntees that men coude thinke
. . . Wo(e) was his cook, but — if his sauce were
Poynaunt and sharp, and redy al his gere.

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Of fish and flesh, and that so plentyous,
It snewed in his hous of mete and drinke,
Of all deyntees that men coude thinke
. . . Wo was his cook, but-if his sauce were
Poynaunt and sharp, and redy al his gere.

Bake-meats were pies or pie crusts made of raised pastry and called *coffyns* (coffins) which were, in the words of Andrewe Boorde in **A Dyetary of Helth** (1542), flesshe that is *beryd in paast* ('buried in pastry').

There is a menu for *A fest for a franklen* in John Russell's **Boke of Nurture** (1430), edited by Frederick J. Furnivall for the Early English Text Society in 1868. It gives us a good idea of what kind of delicacies might have 'snewed' in the Frankeleyn's house.

First course: Brawne with mustard, bakon with peason (bacon and pease pottage), beef or motton (mutton) stewed, boyled Chykon or capon, rosted goose & pygge, bakemete or Custade, when eggis and crayme (eggs and cream) be in season.

Second course: Mortrowes, or Jusselle (pudding of egg and breadcrumbs), veel, lambe, kyd, or cony (rabbit), Chykon or pigeon rosted tendurly (tenderly), bakemetes or dowcettes (*doucettes* — sweet pastries).

Third course: Frytowrs (fritters), leche (sliced foods). The feast closed with fruits: appuls & peris (apples and pears) spices, brede and cheese, spised cakes and wafurs (wafers, rather thin waffles), served with mead and *bragot* (spiced ale and honey).

Recipes or *nyms* (the word recipe comes from the Latin meaning 'take' and nym is the same word in Middle English) survive for all these Chaucerian dishes in cookery rolls and manuscripts and in later printed books (from 1500 onwards) from which we are able to test the Medieval taste and adapt it for today.

The Forme of Cury. All the recipes here, except one, come from the famous cookery roll known as *The Forme of Cury,* meaning the 'manner of cookery' *(queuerie* in Norman French being the business of a *queux,* or cook). This was compiled for King Richard II by his master cooks in 1390 and contains 196 recipes for both royal feasts and common household food.

The precious roll, written in black and red ink, is made up of metres of vellum (calfskin) with seven joins of blue stitching. It once belonged to Queen Elizabeth I. In 1979 while researching herb, garden and cookery books at the British Library in London, I was able to copy out many of the recipes from the first printed version, compiled by the Rev Samuel Pegge in 1780.

The young Richard II, seen in two separate incidents, addressing revolutionaries (at right) and witnessing the death of Wat Tyler their leader (at left) in this illustration from *Chroniques de France et d'Angleterre*, by Jehan Froissart, about 1460.

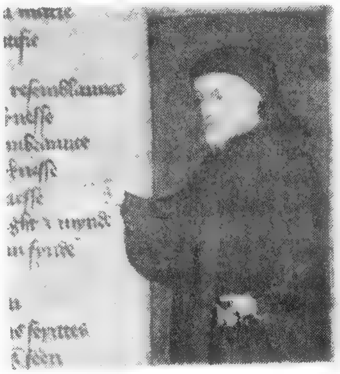
Chaucer and the Plantaganets. Richard II (1377-1399), son of Edward the Black Prince, was a fop and a feaster, a flamboyant Plantaganet, born and raised in Bordeaux. He came to the throne at the age of 10 and in 1381, as a 'boy king' aged 14, he bravely rode out to Mile End in a gaudy coat of blue and silver to meet Wat Tyler's peasant army fresh from looting London and sacking the Savoy Palace of his uncle and guardian, John of Gaunt, Duke of Lancaster. At a second meeting of the angry mob at Smithfield, Richard was present when Wat Tyler was killed by William Walworth, Lord Mayor of London.

However, Richard was vain, headstrong and unstable and was finally deposed and murdered at Pontrefact Castle at the age of 32. He was famed during his 22 years on the English throne for his feasts, pagentry and patronage of the arts, doing things on the grand scale and often finding himself in debt. "He spent the public money in eating and drinking", wrote W. Carew Hazlitt in **Old Cookery Books** (1886), "instead of wasting it as his grandfather (Edward III, victor of Crecy) had done in foreign wars."

At the royal palace of Sheen, where he built a garden pavilion for banquets in 1385, Richard is said to have kept 300 servants to cook and wait at table. At one feast recorded by Holinshead and Froissart, 10,000 guests were fed and entertained in a single day.

Geoffrey Chaucer's livelihood depended very much on the patronage of the Anglo-Norman Plantaganet royal family who ruled on both sides of the Channel during his lifetime. Edward III gave Chaucer a life pension, a pitcher of wine daily and a dwelling over the gate at Aldgate in 1374 as a reward for his diplomatic journeys and missions of espionage to France, Flanders and Italy. In 1380, Edward's grandson, Richard II made Chaucer Clerk of the King's Works at Westminster and St George's Chapel at Windsor. In between, Chaucer married Phillipa de Roet, whose sister Katherine became the mistress of John of Gaunt, Duke of Lancaster, and then the Duke's third wife in 1396 (Phillipa died in 1387). Henry IV, who took the throne in 1399, and was John of Gaunt's son, continued the royal sponsorship after the poet addressed him with his *Compleint to his Empty Purse*.

So Chaucer is ably fitted to reflect the life of all classes of society and, as the first great master of the English language, he had the literary talent to do it. His influence continued because his works were among the first printed books, helping to stabilise the developing language in the East Midland or London dialect he had chosen. Caxton printed **The Canterbury Tales** in 1478 and again in 1482, Richard Pynson in 1492 and Wynkyn de Worde in 1498.



The 'authentic' portrait of Geoffrey Chaucer, early 15th century.

The Recipes

The recipes are first given in the original Middle English, followed by a translation into modern English. The adaptations stick close to the originals, though some modern substitutes are suggested for exotic ingredients which may be difficult to obtain. Suggested quantities are for four people.

Slit sops. Take the white part of leeks and slit them and boil them in wine, with oil and salt. Toast bread and lay it in dishes with the stew over it and serve.

LEEK SOUP

4 fat leeks
2 tablespoons butter or oil
2 cups white wine
salt & pepper to taste

Cut off the roots and most of the green leaves of the leeks. Slit them lengthways into four and soak or wash thoroughly to remove grit from inside the leaves. Cut the stems in half and *saute* them in oil or butter until they wilt and soften. Add the white wine, salt and pepper and simmer gently for 15 minutes. Serve in soup bowls over toasted brown bread.

Variations: Thicken the soup by adding a *roux* just before serving, or serve as an entree of leeks stewed in wine by using only half a cup of wine.

Pies of Paris. Take and chop butts or pork and veal mixed together and put it in a pot, adding broth and some wine. Let it all boil together until it is enough. Then take it from the fire and let it cool a little and add raw egg yolks, powdered ginger, sugar and salt, minced dates and raisins (from Corinth). Make coffins (pie cases) of good pastry and cook the mixture in them. Cover and let bake enough.

MINCED MEAT PIE

500g minced or diced veal & pork
½ cup red wine
½ cup stock or broth
(or water with 2 stock cubes)
1 egg, or 2 egg yolks
¼ cup each minced dates and raisins
½ teaspoon ginger, sugar & salt
shortcrust pastry

This makes a generous serving for four people. We were able to buy mixed veal and pork already minced from a butcher in Sydney's Eastern Suburbs. Ground or finely diced meat will do just as well. Line a pie dish or case with your favourite homemade shortcrust pastry, adding one tablespoon of icing sugar to the mixture (or use a frozen prepared shortcrust pastry). Reserve one-third of the dough for the top crust.

For the filling, place the meat, wine and stock in a saucepan. Bring to the boil, then simmer until cooked (about 10 minutes). Strain the cooking juices into a separate container and allow meat and liquid to cool. Then beat one egg or two yolks and mix thoroughly into the meat, adding the dried fruit and spices.Place this in the saucepan with about half the stock and bring to the boil again and stir to thicken. Cool before pouring into the lined pie dish.

Moisten the the top edges of the pastry with water and roll out the top crust. Cut the central hole for steam to escape. Pinch the edges together and decorate the top with stars, flowers or other shapes with the left-over pastry. Glaze the top by brushing on beaten egg or egg yolk.

Bake in a hot oven (180°C) for 40 minutes or until the pastry is crisp and brown. If using a pie case, remove the pie, glaze the sides and return to the oven for a further 10 minutes. The pie should be a golden brown colour when ready to serve. Pastry was particularly prized in Chaucerian times, as it provided food in an edible dish at a time when plates were not used. Sweet pies with spices like this example were the forerunners of the British Christmas 'mince' pies, which now omit the meat.

Variation: Serve in small pies or tarts, one for each guest. This is good hot or cold.

Blankmanger (White dish). Take capons and boil them. Then take them from the pot. Take blanched almonds. Grind them and mix them with the capon broth. Pour this almond milk into a pot. Wash rice, add it and let it boil. Then take flesh of capons, tear into small pieces and add it. Take white grease (lard), sugar and salt and cast them in. Let it boil. Then divide into portions and garnish with sugared aniseed (red or white) and almonds fried in oil and serve it forth.

CHICKEN & ALMONDS

4 pieces capon or chicken
(breast, fillet, leg etc)
110g whole almonds
1 cup rice
2 cups water
2 teaspoons sugar
1 tablespoon butter
salt & pepper

Florrish (garnish) with extra few almonds, sugared aniseed, parsley or watercress.

Gently boil the chicken pieces in salted water for about 45 minutes, or until tender. Remove the chicken and set aside. Grind almonds in a mortar and pestle (or with two

Wel loved he by the morwe (morning) a sop in wyn — Prologue.

Slete soppes

Take white of leeks and slyt hem and do hem to seeth in wyne, oile and salt. Rost brede and lay in dysshes and the sewe above and serve it forth.

Forme of Cury, 1390

. . . And wel bake a pye — Prologue.

Pies of Parys

Take and smite faire buttes of porke and buttes of vele togidre, and put hit in a faire potte, and putte thereto faire broth, And a quantitie of Wyne, And lete all boile togidre til hit be ynogh; And then take hit from the fire, and lete kele a litel, and cast ther — to raw yolkes of eyren, and poudre of gyngevere, sugre and salt, and mynced dates, reysens of corence: make them coffyns or feyre past, and do it ther — ynne, and kevere it & lete bake y-nogh.

A Boke of Kokery (Harleian MS 4016), C 1450.

For blankmanger, that made he with the beste — Prologue.

Blanc manger

Take Capons and seeth hem. Thenne take hem up. Take Almandes blanched. Grynd hem and alay hem up with the same broth. Cast the mylk in a pot. Waisshe rys and do therto and lat it seeth. Thanne take brawn of Capons. Teere it small and do therto. Take white grece, sugar and salt, and cast thereinne. Lat it seeth. Thenne mess if forth and florrish it with aneys in confyt rede other whyt and with Almands fryed in oyle and serve it forth.

Forme of Cury, 1390

tablespoons of water in a blender). Add ground almonds to the chicken broth and allow them to soak for 10-15 minutes.

Cook the rice in almond milk and broth, adding butter and sugar and more salt if needed. Meanwhile, dice the cooked chicken. When the rice is just about ready, stir in the chicken pieces and mix well. Warm until well heated throughout. Garnish and serve. This combination of chicken, almonds and rice has an unusual sweet, nutty flavour. Fish or pork were also used to make blankmanger. The dish may be reheated in an oven at moderate heat before serving.

Sawge (sage), onyons and leek (left to right). Woodcuts from *The Grete Herball*, printed by Peter Treveris, 1526.

Wel loved he garleek, onyons and eek (also) lekes — Prologue

Salat

Take parsel, sawge, garlec, chiboll, onyons, leek, borage, mynte, porrect, fenel and ton tressis, rew, rosemarye, purslarye. Lave and waishe hem clene; pike hem small with thyne hond and myng hem wel with raw oile. Lay on vynegr and salt, and serve it forth.

Forme of Cury, 1390

Salad. Take parsley, sage, garlic, chives, onions, leek, borage, mint, spring onion, fennel, cress (town cresses), rue, rosemary, purslane. Rinse and wash them clean; break into small pieces with your hand and mix them well with raw oil. Add vinegar and salt and serve it forth.

SHARP HERB SALAD

This is meant to be a 'green' herb salad, made from freshly collected young plants and leaves so the parts of garlic, onions and leek selected would be the leafy blades. It echoes the description in *The Flower and the Leaf* (once attributed to Chaucer) in which maidens went about *gadring pleasaunt salades* in a meadow.

Collect a handful each of all or any of the ingredients mentioned and tear them into pieces by hand. Make a salad oil, using olive oil or any vegetable oil, of three parts to one part of vinegar, adding salt to taste. Use only the smallest young leaves of borage which otherwise are too prickly and scatter the salad bowl with the beautiful blue borage flowers which add a tang of cucumber flavour. This is still a 'sharp' salad, of course, but it is refreshing on a hot summer's day or evening served with chilled white wine. An old practice was to put borage leaves and flowers into white wine cups as a 'cool tankard' because borage has the reputation of giving courage and making the heart glad and merry.

He poureth pesen . . . The Legend of Good Women.

Perry of Peson

Take peson and seeth hem saft and cover hem til thei berst. Thenne take up hem and cole hem thurgh a cloth. Take onyons and mynce hem and seeth hem in the same sew and oile there with; cast thereto sugar salt saffron and seeth hem wel thereafter and serve hem forth.

Forme of Cury, 1390.

Puree of peas. Take peas and boil them until they are soft, then cover them until they burst. Take them out and strain them through a cloth. Take onions and mince them and boil them in the same stew, with oil. Throw on sugar, salt, saffron and boil well after that and serve them forth.

PUREE OF PEAS

500g fresh shelled or split peas	1 tablespoon raw sugar
½ small chopped onion	sprinkle of salt
2 tablespoons oil	few saffron threads

Boil the shelled peas until they burst. Push peas through a sieve with a small amount of their liquid. Add a finely chopped onion, oil, sugar, salt and saffron, mixing with a mortar and pestle (or use a blender). Reheat gently before serving. The result is a rich, tasty bright green, puree, with the consistency of apple sauce, which may be served with any meat, especially pork.

Peeres in confyt

Take peeres and pare hem clene. Take gode red wyne and mulberes other sandres and seeth the peers thereinne. And whan thei buth ysode, take hem up, make a syrup of wyne greke, other vernage with blanche powdor, other white sugar and powdour gynger, & do the peres therein. Seeth it a lytel and messe it forth.

Forme of Cury, 1390.

Pears in confection. Take pears and peel them clean. Take good red wine and mulberries or powdered sandalwood and boil the pears in it. And when they are cooked, take them out. Make a syrup of Greek wine or Vernage (*Vernaccia,* a fortified Italian wine like Muscatel), with 'white powder' or white sugar and ground ginger and put the pears in it. Boil it a little and serve if forth.

PEARS IN WINE SYRUP

1 tablespoon icing sugar

1 or 2 pears for each diner	½ teaspoon ginger powder
2 cups red wine (enough to cover pears in the saucepan)	
½ teaspoon red sandalwood powder	½ cup Muscatel or, other fortified wine

Blaunch powdour (mixed spices of ginger, cinnamon and nutmeg), may be substituted for icing sugar & ginger.

I moste han of the peres that I see,
Or I mot dye, so sore longeth me
To eten of the smale peres grene
— Epilogue of The Millers Tale.

Clean and wash the pears. Cut them in half, core and remove the skins if they are hard. Boil in red wine and sandalwood powder (or substitute cup fresh mulberries to obtain colour) for 15 minutes, or until they soften but remain firm. Take out the pears. Make a syrup by combining the wine, Muscatel, icing sugar or spices and boil until this is reduced and thickened. Place the pears in the syrup, bring to boil and serve up.

Variations: Pears and syrup may be reheated, or allow to cool and serve cold. The sandalwood makes the outer surface of the pears quite red. A dash of cream provides a rewarding taste and colour contrast.

The recipe for *Pies of Parys* is taken from the Harleian MS. 4016 of about 1450 in the British Library, published in **Two Fifteenth Century Cookery-Books,** edited for The Early English Text Society in 1888 by Thomas Austin. The recipes are mainly derived from those in *The Forme of Cury* and share their Norman French titles and ingredients.

The Table

Trencher bread. Make trenchers by cutting lengthways through a large loaf of stale white bread (about four days old). Cut the bread into squares and pare off the crusts. Arrange four slices in a square with a fifth in the middle on top. Slices should be about the thickness of a finger. Round loaves of Greek bread may be used to cut out single large round or oval shaped trenchers. To save the tablecloth lay the trenchers in plates or wooden platters. It's likely your guests will want to eat these soggy 'edible plates' at the end of the meal.

Liquor. Ordinary types of red, rose or white wine are acceptable, so is cider. **Malmsey,** a popular wine in Chaucer's time, came first from Monemvasia in southern Greece, but also from Candia in Crete, other Aegean islands and southern Italy, so sweet Italian wines or resinated wines like *retsina* would be appropriate. **Mead** may be served with the pears at dessert, or after dinner. **Merrydown** mead is easy to obtain and very good. **Sack** or dry sherry was served before diner. Rosemary wine is delicious in summer. Chip sprigs of green rosemary and soak them in white wine for four or five days, or simply place a large sprig of rosemary in a flagon or white wine. Strain off the herbs before serving.

Greet chere made our hoste us everichon,
And to the Soper sette us anon.

RECHARGEABLE GEL BATTERY LANTERNS

We made a mistake in the very first sentence of Peter van der Wyk's article **The renewable light** in Earth Garden 48 (page 12). It should read '6 volt lantern battery' (not 5 volt) of course.

Also the last sentence at the end of the top right-hand paragraph on page 13 should read . . . "For the miniature screw fittings you can buy 0.2 and 0.1 amp light globes" . . . not 2 amp and 1 amp as stated.

Peter has some more to say about rechargeable gel battery lanterns:

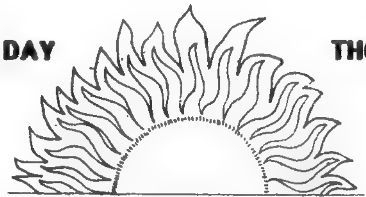
After a lot of testing on the lantern batteries that we sell, I have found the voltages to be a little bit higher than other lead-acid batteries. The fully charged 6 volt gel battery settles down to a voltage of about 6.6V instead of 6.3V as stated in the article. Consequently, I would allow the voltage during charging to climb up to 7.3V instead of 7V.

I would like to add a comment about using this type of charging system (as mentioned in the article) for charging a smaller battery. You must make sure that the globe you use in the charging lead is small enough (in amperage) to suit the battery that you intend to charge. I had prescribed a minimum of about half an amp (0.5 amp) for the lantern battery, but for a smaller battery you must use a correspondingly smaller globe.

The recommended charging rates of Nicad batteries are often printed on the sides of these batteries and these figures can be used as a guide to the size of light globe that you choose for the charger

— Peter van der Wyk

SUN DAY THOUGHTS



Future local solar energy systems, for all to observe and understand, will most likely teach us to be more conscious of our energy waste habits, as compared to the present situation where energy is distributed from a far away, seemingly inexhaustible energy plan.

K. HOHENEMSER, Sun Day Thoughts, *Environment* Vol 20, May 1978.

Dear Folks,

Just a short note to say a big thank you for fulfilling my order for the back issues of **Earth Garden.** I now have my collection up to date.

I have always been a self-sufficient type, being brought up as a youngster in Hard Times as well as drought in the late 30s and early 40s. In the last few years I have been a disabled person and have had to fall back on old knowledge to help make ends meet. I also hold well with herbal treatment and remedies, which I find have been a great help to me with my ailments.

John Crispin, Rubyvale, Queensland.

Dear Keith & Irene,

Keep up the good work! have been here for 9 months and going well. Started from scratch on 550 acres of virgin bush in February. Our friends think we're quite mad to start again. Husband retired in 1980 and couldn't face life in a home unit in suburban Adelaide as most of his contemporaries are doing. Only confirmed to them that we indeed did have a mad streak in us!

Grateful for our pioneering spirit which has kept us going in a situation without the usual 'mod cons'. Glad of your magazine for support and confirmation.

Cheers for now, Neonie & Bert Halley, Rye Park, NSW.

Dear Irene & Keith,

Being the humble country lad of many moons ago (and still trying to get back to some elusive acres) it was your very first **Earth Garden** that enabled me to find out that out there were other people striving to practice a natural lifestyle. Forty-eight editions later, my more natural lifestyle means growing my garden, my chooks, my spouse and little cherub and having practised as a naturopath now for five years. And EG helped provide the spark! You are old friends.

Cheers and good health, Lee Stickels, Yarra Glen, Victoria.

earth people write

Dear Earth Gardeners,

Could someone out there please help us? We want to recycle all our water for the vegies. This includes our washing machine water. What we need is a recipe for soap which can be used for washing people, plates and clothes and is safe to put on the vegies.

If there are any EG people living in our area, please feel free to call in and say hello. We are Tony, Katie and our son, Jazz. We also have a room to rent for any peaceful person. Kids are welcomed too, but no dogs, cats, TVs or yobboes. Look forward to hearing from you all.

Love & Peace, Tony Narvo, 123 Railway Street, Teralba, NSW, 2284.

Dear Readers,

As a beginner on the land, I welcome your magazine. I've received lots of helpful hints and perhaps more importantly lots of encouragement.

Just over a year ago I bought 160 acres on the lower Hunter Valley, about 2-2½ hours from Sydney. It has mountains, creek flats and a long creek frontage.

As well as using natural farming methods, I am attempting what you might call natural living which includes, obviously, natural food — unfired, unprocessed. That is, raw!

If there is anyone interested in pursuing this kind of natural living, they would be welcome to stay on my land in exchange for four hours help per day, four days per week.

By a raw (live) food diet I mean no cooking, no herb teas or coffee, etc. I'm not trying to convince anyone that this diet is "right". It just happens to be the diet I've chosen because it has helped me a lot from the point of view of health. Anyone interested is welcome to join me, but they'd have to supply their own food and accommodation.

Andrew Toth, Lot 392, Watagan Road, Watagan, NSW, 2325.

Dear Friends,

Stick with the ads and the computer age. Accept and use what's good today and reject the tacky and unnecessary. Here endeth the First Lesson.

Your sustainer, Sheila Carron, Wooroloo, WA.

Dear Permaculturists,

In case you haven't heard, the **PC Designers' Newsletter** is alive and working. Send 60c in stamps to the address below for a sample copy. We are also looking at starting a Permaculture newsletter for the Tropics alone. Drop us a line if you are interested.

Regards, Brian Davies, Helenvale, via Cooktown, Qld, 4871.

Dear Earth Gardeners,

We have a 40-acre block that we hope to move onto within the next few years and would like to ask if there are people who would share some practical advice with us.

We would like help on:

1. Possible pitfalls people have had in building conventional "kit" homes on their properties;
2. Advantages and disadvantages people have in teaching their children by correspondence through choice not necessity;
3. Any practical advice on building a dam on a fairly flat block;
4. The type of equipment needed or found most useful when one actually takes the plunge onto the "block".

All letters will be replied to personally and promptly and it is possible we may become "pen pals" with the view of meeting in the future.

Love, peace and tranquility, Gerald, Heather, Erin-Kelly and Kaden Hanley, 7 Blair Place, Minto, NSW, 2566.

Dear Earth Garden,

This is the first time I have ever written to a magazine. When I first read your magazine I felt that it showed how to achieve a better life in a practical, workable way, free of mysticism, drugs and unrealistic idealism.

My husband and I, in our early 40s, late 30s, and our two-year-old son are about to begin our own search for this better life. We will be visiting Tasmania from April 3 to April 15, 1986. While we are there we will be looking for land in the north and north-east of the island. We would appreciate any help or information Tasmanian Earth Gardeners could share with us during our visit.

We have our own Campervan accommodation and hope to see as much as we can during our visit. We would also welcome any letters from Tasmanian readers. We will be grateful for any advice your readers can share with two beginners.

Jan & Joan Holland, 55 McConnell Street, Kensington (Melbourne), Victoria, 3031.

Dear Keith & Irene,

Regarding Kate Prout's letter in **Earth Garden 48**, page 57. You may care to inform her (and others) that most Papuan New Guineans use the old treadle or hand-sewing machines. They are sold **new** through all three of the major retail stores, being Carpenters New Guinea Co Ltd, Steamships Trading Co Ltd and Burns Philp (PNG) Ltd, all of which are part of Australian-based companies. I've seen hand-operated **Singer** machines priced from as low as $A 88.00 approximately. I'm not aware of the spare parts situation. The point is that these machines are still produced for sale in countries such as Papua New Guinea.

Regards, R. J. Savage, Boroko, Papua New Guinea.

Dear Earth Garden Readers,

We have finally made it to Noosa. It's a beautiful area, frost-free, avocado, pineapple and macadamia country with the bonus of superb beaches. We were very fortunate in finding 10 acres here at a reasonable price. There are still a few good buys in the locality and if any readers are sincerely interested in buying up here (no dreamers please), let me know what you are looking for and how much you want to pay and I will make enquiries for you. Please let me have a SAE for reply.

We are still operating as before and would like to hear from friends old and new.

Ron and Shirley Haines, Tingira Lodge, Tingira Crescent, Sunshine Beach, Queensland, 4567.

Dear Keith & Irene,

Thanks for writing the **HARD TIMES HANDBOOK**. The best ring about it is the philosophy behind it. I find it a very positive book as well as really useful.

My husband, two-year-old son and I live in an old but progressive outer suburb in an old house on a larger than average block. We bought the house for $20,000 nearly five years ago. What a mess it was and the yard was full of rubbish. Gradually we've renovated it, dumped the junk and established a garden. Each year we plant another fruit tree or two and some native bushes or trees. We have a few chooks, grow some of our own vegetables and each year there is more fruit to make into jam, chutneys, sauces, or to preserve, as well as to eat fresh. We accept any offers of fruit and vegetables, swapping some with friends.

I work part time, my husband mows a few lawns and does a few odd jobs when they turn up. Recently I've started making gum leaf necklaces which I've given away as presents. I have also sold some at work and a couple through a local handicraft shop. I have found it is very important to present any crafts for sale in the best way possible. I sell my necklaces on a rectangle of cardboard on which is pasted an attractive photocopied border. This sets the necklace off nicely and makes it easy to display them in the shop.

I would advise anyone trying to talk a shop owner into selling their crafts to:

1. Present their craft work to the best advantage.
2. Have a price in mind.
3. Know how much similar items are selling for.
4. Be prepared to wait and don't be discouraged.

To help make ends meet we do a lot of things suggested in your book. I buy most of my clothes and those for my son second-hand. The cheapest places are church jumble sales. At the end of last summer, I bought several T-shirts for 20¢ each! I buy several sizes ahead for my son and store them in labelled boxes. I make sure I stash a couple of herb bags in each box to repel moths. I bought blankets for his bed second-hand for $3 each.

I keep all my cards and wrapping paper to use again. I save any unmarked envelopes and a couple of friends pass these on to me too. I make my own greeting cards and writing paper as you can see in this letter. This saves quite a few dollars in the course of a year. Keep up the good work.

Yours truly, Marie Clark, Gawler, South Australia.

Dear Keith & Irene,

Hope I'm not too late to order a copy of your **Illustrated Earth Garden Herbal**. I've become interested in the idea of using herbs around the gardens and fruit trees to deter pests. We also grow a few orchids, so hopefully, herbs will help around them as well. We only discovered your very interesting and enjoyable magazine at the beginning of 1985. We look forward to each issue.

Yours faithfully, Lyn & Mike Iverson, Helensvale, Queensland.

Dear Irene, Keith & Melissa,

From practical experience, the way to reduce household electricity costs from $90.00 down to $28.00 for a 90-day period is to install a combustion stove. My **Everhot 150** uses a quarter the amount of wood as some other larger makes.

An elevated tank and hot water system gravity feed hot and cold water into the house, using an electric pump to fill the high tank when we have not had sufficient rain.

Buying a large chainsaw, **Stihl Farm Boss**, a log splitter and having a trailer, with access to plenty of wood at no cost, has made the changeover to a more economical system.

The next hurdle is to own a more economic motor vehicle in running costs. Driving about 60 miles a day to and from work is a costly doing, though there is no State tax on petrol here. I have been considering alternative ways. Do you know, please, if vehicles can be run on batteries charged by solar cells or electricity? Thanks for your help.

Sincerely, Nyra Pillinger, Jimboomba, Queensland.

Dear Nyra — We've reported on experimental solar electric vehicles like the **BP Quiet Achiever** which crossed Australia (**Earth Garden 44**), but there are no commercial electric (or solar) vehicles on the market here in Australia and those in other countries have a maximum range of about 120 km before their batteries need recharging. Still, there are good prospects for solar transport as you'll see in the item in our **Energy Pulse** column this issue — Keith & Irene.

Dear Sirs,

Why doesn't someone down there **grow** some blackberries instead of feeding stinking goats on them? Anyone who hasn't eaten a blackberry pie hasn't eaten a pie and they make good wine, too. I don't think it would be too much trouble to sell punnets of blackberries even in these times.

Yours faithfully, J. B. Green, Dimbulah, Qld, 4872.

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A mixed bag

Dear friends,

This is very much a 'mixed bag' issue of **Earth Garden**, covering a wide variety of subjects. We think there could only be a few magazines in the world (if any) in which you can read articles such as recipes for a Medieval feast, 20th century solar technology, growing algae in the Phillipines, a houseboat holiday in Kashmir, or tales from people trying to live a self-reliant life in Australia. It's all in this issue! No wonder **Co-Evolution Quarterly** (now the **Whole Earth Review**), published in San Francisco, called us an "offbeat little magazine from Down Under".

Advertising. Thanks for all the favourable comments on our decision to accept appropriate advertising. This has helped us keep our promise not to increase the cover price. The 'unclassifieds' ads, especially, is a section which looks like growing to fulfil a real need in providing a magazine market for EG type goods and services of all kinds. A listing in our **Unclassifieds Marketplace** (or our **land lines**) costs $12.00 for 50 words (maximum), plus name and address. Deadline for EG50 is April 10.

Subscriptions. It's our practice to send copies of Earth Garden to subscribers before they go to newsagents and bookshops. Unfortunately this did not happen with our last issue, EG48. About a year ago, we began using a mailing house for bulk mail at issue time. Just as EG48 reached them, the mailing house moved its operations, which disrupted the mailout for 10 days. Our apologies. It should not happen again and we are striving to ensure that subscribers do receive their copies first. Have you renewed your subscription?

Books. Our books are selling very well, so well in fact that the **Essential Earth Garden** is now out of stock and will probably be reprinted. We're down to the last box of the first edition of **HARD TIMES HANDBOOK**. It is currently being reprinted by Nelson Publishers. The cover price will probably rise, but we will honour all orders for this book at $7.50 (including postage) until May 1986 when EG50 is in print. We still have good stocks of The **Illustrated Earth Garden Herbal** and **The Settler's Guide**.

In the past 14 years we've covered all the basic subjects of putting a roof over your head, food in your stomach and small-scale livestock which we outlined in EG1. But these areas continue to expand and diversify. There's still so much we need to know in order to survive and enrich our lives. In the coming 1986 issues, we would especially like to publish articles on making a living from the land, either from a small business run at home or by mail, cash crops and other agricultural income earners. Of course, we'll continue to bring you first-hand experiences, good or bad, from readers. People learn best from other people. Please help us all by contributing your story or by telling us what you want to read in **Earth Garden**.

E.G. 50! Our next issue is very special for us because it will be our fiftieth, a venerable number of steps along the **Earth Garden** path. We think that's quite an achievement for a 'committee of two' people working at home together and we're pleased and proud about it. We are plannning to focus on sustainable agriculture and land ethics - the idea that we are all caretakers of our earth - in this special number. We like the quote from Wendell Berry in the October issue of the U. S. publication MANAS, sent to us by Jack Williams of Victor Harbor, South Australia: "**A sustainable agriculture does not deplete soils or people.**"

Amen to that. We look forward to your articles, letters and thoughts.

Peace & love,
Keith & Irene.

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Back copies

EG1: Move out . . . food co-ops . . . Kibbutz and Moshav . . . Montsalvat . . . herbs . . . Fred Robinson . . . bean sprouts . . . compost and mulch . . . comfrey . . . earthworms.

EG2: Start a garden . . . Neil Douglas . . . Keyline system . . . Kiewa farms . . . drying and storing food . . . hydroponics . . . recycling garbage . . . nutrition.

EG3: Herbs . . . compost . . . fast fertiliser . . . all about goats . . . mudbricks . . . domes . . . water wheel . . . bread . . . salads . . . pottery . . . spinning . . . vegies.

EG4: The honey bee . . . back to the land in Tassie . . . the transition . . . black sheep . . . tanning . . . candles . . . bread . . . donkeys . . . a wall-hanging.

EG5: The wind — windmills . . . windpumps . . . generators . . . raku pottery . . . Cinva ram . . . poultry . . . Hamburghs . . . moon planting . . . fallout shelter . . . vegan way.

EG6: Solar 1 — sun cults . . . solar cooker . . . sundials . . . Lost World . . . Clifton Pugh . . . concrete house . . . Shalom . . . Cajun cookin' . . . horses . . . spirit of Nimbin.

EG7: Solar 2 — hot water . . . Mudbrick techniques . . . Angora goats . . . make a leather bag and belt . . . mushrooms . . . natural dyes.

EG8: Gas power — methane digester . . . by truck to Tassie . . . cumbungi hats . . . inkle loom . . . candles and tapers . . . country cottages . . . A-frame . . . school gardens . . . sourdough.

EG9: LP gas . . . Mary's place . . . building with stone rubble (slipform) . . . macrobiotics . . . oats . . . ducks . . . rug frame . . . how to kill a pig.

EG10: Granite house . . . geese . . . chip heater . . . bamboo flutes . . . build beehives . . . Jarrah shingles . . . mudbricks . . . Bio-dynamics . . . seaweed . . . tandem . . . Index (EG1-10).

EG11: Water — hydraulic ram . . . waterwheels . . . okra . . . seed primer . . . heavy horses . . . tomatoes . . . soft technology . . . wine . . . hard cheese . . . start with hens.

EG12: Keeping food — drying . . . salting . . . bottling . . . storing . . . tahu . . . tropic delights . . . plant propagation . . . plans for a solar water heater . . . solar stills and cooker . . . Moora Moora.

EG13: OUT OF PRINT.

EG14: Self-sufficiency — gardens for all . . . Botobolar vineyard . . . Terania Creek . . . millet . . . Robinson Crusoe . . . Walden . . . The Nearings . . . stone building.

EG15: A Lytel Herbal — growing and using herbs . . . text and illustrations from the classic 16th C herbals . . . modern commentary . . . Index to EG15.

EG16: A Lytel Herbal (Part 2) — comfrey, lavender, wormwood, yarrow . . . poultry shed . . . peafowl . . . goats . . . basic beekeeping . . . rammed earth building . . . hydraulic ram.

EG17: Fencing . . . dry stone walls . . . make soap . . . nets . . . pole shelter . . . breeding black sheep . . . The Autonomous House . . . asparagus . . . Aeolian harp . . . ducks . . . Khaki Campbells.

EG18: Fruit garden . . . oranges . . . lemons . . . olives . . . nuts . . . tropical fruit . . . fodder trees . . . road building . . . wood fired kiln plans . . . Cinva-ram cottage . . . sunflowers . . . homebirth.

EG19: Wood heat — pot bellies . . . Jotul . . . cooking . . . making a quid . . . build a storage cellar . . . bushfires . . . stonefruit . . . macadamia nuts . . . binding your EGs . . . tree planting . . . budding.

EG20: Apples . . . pears . . . cordon and espalier . . . build a haybale pig house . . . pollen . . . rose hips . . . mudbrick flats . . . solar homes . . . gourds . . . preserve fence posts.

EG21: Womancraft — all articles by women . . . earthly arts . . . axewomanship . . . glove puppets . . . spinning . . . weaving . . . easy rugs . . . Sumatran house . . . old roses . . . Index (EG10-20).

EG22-23: Australian Access Sourcebook . . . 150 pages . . . Aborigines . . . organic growing . . . permaculture . . . earth building . . . wind . . . solar . . . water power . . . technology . . . water supply . . . access to groups, plans, books, tools.

EG24: Place — 24 new settlers write . . . Mare Carter . . . Ron Edwards . . . Neil Douglas . . . Gundaroo Store . . . Rainbow Region . . . Mt Oak . . . Moora Moora . . . Universal Brotherhood . . . bush ashram.

EG25: Australian Access Sourcebook (Part 2) — 130 pages . . . livestock . . . aquaculture . . . fencing . . . killing . . . tanning . . . food and nutrition . . . grain grinders . . . solar homes . . . methane . . . greenhouse . . . Dorothy Hall.

EG26: The earth-built kasbahs . . . owner built homes in stone . . . timber . . . mudbricks . . . a slab cottage . . . tree felling . . . solar electrics . . . acorns . . . compost dunny . . . quandong . . . pumpkin recipes.

EG27: 100 tropical food plants for Australia (part 1) . . . 16 legumes . . . winged bean . . . pigeon pea . . . lablab . . . cowpea . . . adzuki bean . . . blacksmithing . . . bluestone building . . . wok cooking.

EG28: Tropical food plants (part 2) . . . horse and buggy . . . packhorsing the Alps . . . black sheep . . . Merinos . . . bullocks . . . tamarillo . . . stringybark baskets . . . solar trike . . . persimmons.

EG29: Mudbricks — the monastery at Stroud . . . Bob's bonza brickmaker . . . earth floors . . . curved walls . . . herb roof . . . cutting axe . . . low energy design . . . coconut mats . . . mangoes . . . tropical food plants (part 3).

EG30: Organic growing — compost heaps, pits, trenches, boxes, bins and barrels . . . no-dig . . . mulch carpets . . . semi-arid growing . . . preserving figs . . . tempeh . . . pasta . . . glass bottle windows.

EG31: Energy — make a hydraulic ram . . . second-hand windpump . . . mudbrick sequels . . . freezing food . . . zucchini glut . . . drying fruit . . . all about sprouts . . . hot box cooker . . . building a log house (part 1).

EG32: Year of the Tree — St Barbe Baker . . . tree tales . . . how a tree works . . . farm tree . . . native from seed . . . coppicing . . . Neil Douglas interview . . . cob building . . . log house (part 2).

EG33: Tenth anniversary issue . . . timber felling . . . lifting poles . . . post and beam design . . . log house (part 3) . . . parquet floors . . . backyard rabbits . . . goats . . . fowls . . . dry pit loo . . . portable henhouse.

EG34: China — communes . . . trees . . . fish farming . . . recycling human wastes . . . biogas . . . transport . . . travel notes . . . Chinese earth building (Ron Edwards) . . . rainforest . . . bread and jam.

EG35: Bees and trees — tribute to St Barbe Baker . . . backyard bees . . . mudbrick workshop . . . footings for earth walls . . . make a solar collector . . . magpies . . . earthworms . . . fodder trees.

EG36: Retrn to Nimbin . . . new settlers . . . a woman builder . . . pawpaw plantation . . . solar electric systems . . . potty garden . . . choughs . . . Peru . . . lavender sachet . . . biological building . . . farm structures.

EG37: HARD TIMES . . . making paper . . . newspaper fuel . . . rags to rugs . . . barter . . . slush lamps . . . sawdust stoves . . . Depression dodges . . . hand grain mills . . . 120 household hints.

EG38: Hard Times tucker . . . bread . . . soups . . . yoghurt . . . no-meat meals . . . beer . . . electric grain grinders . . . Gujarati village . . . mudbrick hermitage . . . earth walls and bushfires . . . Noel's island.

EG39: Build Peter Pedal's bike wheel wind generator . . . fire without matches . . . bushfire defensive house . . . avocado growing guide . . . rosehips . . . car battery power . . . farm energy . . . backyard food.

EG40: Communities . . . running a food co-op . . . three in a caravan . . . Scott Nearing's a good life . . . cyder in Tasmania . . . our self-built house . . . earth floors . . . the billy . . . olive oil . . . hares . . . cashew nuts.

EG41: Sahara . . . Timbuktu . . . Uganda . . . pack donkeys . . . horse float journey . . . mat-tents . . . build a S-rotor wind generator . . . damper . . . yeastless bread . . . food co-op accounts . . . real potatoes. . . Index, EG31-40.

EG42: Earth covered homes . . . Burra dugouts . . . slipform stone . . . the flood-defensive house . . . tomato tips . . . deep ecology . . . build a pigsty . . . EG reader survey . . . the Tuareg . . . Jean Pain's methods.

EG43: Earth domes and vaults . . . rendering earth walls . . . quarry bush stone . . . bush shower . . . Peter Pedals' incinerator hot water and Pelton wheel . . . low voltage wiring . . . sheep . . . donkeys . . . horses.

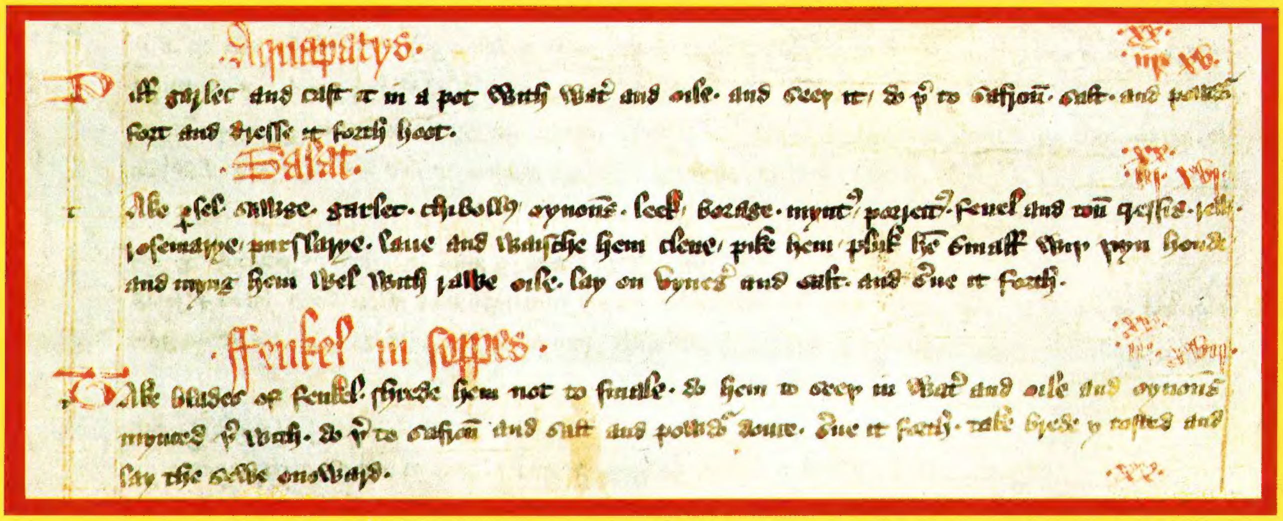
EG44: Plug in the sun — solar electric systems . . . 12V to 240V . . . batteries . . . inverters . . . alternative washdays . . . how to make a pedal drier and 12V computers . . . solar panel booster . . . Solar Trek.

EG45: Waterworks — shifting water with sun, wind and water . . . solar electric pumps . . . gravity feed . . . hydraulic ram . . . Platapump . . . the cyclone-defensive house . . . bunya nuts . . . 12 V problems.

EG46: Windworks — wind generators . . . solar trackers . . . water turbines . . . 12 V bilge pump . . . herbal shampoo . . . compost loos . . . Tanzania . . . the algae pond . . . 12 V lights . . . Krypton lamps.

EG47: Practical projects . . . hanging a door . . . household plumbing . . . waterwheel pump . . . cycling Mongolia . . . the sun-pump . . . livestock . . . Aussie yurt . . . pigeon pea . . . bee tools . . . Peter's pedal machine.

EG48: Bob Rich's rammed earth primer . . . 1930s Dab, Pug and Pise, compost muncher . . . sushi and sashimi . . . Energy Pulse . . . buying an energy system . . . animal shelters . . . hand dug wells . . . ferrocement tank . . . growing firewood.



Aquapatys.

xx.
iiij xvj.

Pill garlec and cast it in a pot with water and oile. and seeþ it, do þerto safroun. salt. and powdour
fort and dresse it forth hoot.

Salat.

xx.
iiij. xvij.

Take parsel. sawge. garlec. chibolles. oynouns. leek. borage. myntes. porrettes. fenel and toun cressis. rew.
rosemarye. purslarye. laue and waisshe hem clene. pike hem. pluk hem small wiþ þyn honde
and myng hem wel with rawe oile. lay on vynegre and salt. and serue it forth.

Fenkel in soppes.

xx.
iiij. xviij.

Take blades of fenkel. shrede hem not to smale. do hem to seeþ in water and oile and oynouns
mynced þerwith. do þerto safroun and salt and powdour douce. serue it forth. take brede ytosted and
lay the sewe onoward.

xx.